

# MONTHLY WEATHER REVIEW.

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No. 11.

## INTRODUCTION.

This REVIEW for November, 1893, is based on reports from 2,997 stations occupied by regular and voluntary observers. These reports are classified as follows: 154 reports from Weather Bureau stations; 39 reports from United States Army post surgeons; 2,121 monthly reports from state weather service and voluntary observers; 29 reports from Canadian stations; 219 reports through the Southern Pacific Railway Company; 455 marine reports through the co-operation of the Hydrographic Office, Navy Department, and "New York,

Herald Weather Service;" 153 weekly reports from 39 U. S. Life-Saving stations; 29 reports from navigators on the Great Lakes; monthly reports from local services established in all states and territories; and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used.

The WEATHER REVIEW for this month has been prepared under the general editorial supervision of Prof. Cleveland Abbe.

## CHARACTERISTICS OF THE WEATHER FOR NOVEMBER, 1893.

### LOW AREAS.

The principal areas of low pressure have been those attending the storms that passed over the Lake region on the 22d and 23d, the coast of the states of Washington and Oregon on the 6th and 7th, the middle Atlantic coast on the 8th; but, in general, the area of the United States was dominated by high pressures and fair weather. On the other hand, the storms of the Atlantic and Pacific oceans have been more severe than usual; the storm that prevailed over Great Britain and the neighboring portion of Europe on the 16th and 18th seems to have been one of the most severe on record.

### TEMPERATURE.

The average temperature was decidedly below the normal throughout the United States; the deficit being from 2° to 5° throughout the region from the Rocky Mountains eastward to the Appalachian range.

### PRECIPITATION.

The precipitation was generally decidedly above the normal on the coast of Oregon, Washington, and northern California, but below the normal in New England.

The amount of snowfall seems to have been fully up to the normal and the quantity lying on the ground at the end of the month, especially in the northern portion of the Lake region, amounted in many places to 20, 40, and even 60 inches.

### INLAND NAVIGATION.

The rivers have generally remained below the danger line. Owing to ice and snow, navigation on the Lakes had generally closed at the end of the month, and for the same reason navigation on the Missouri above Kansas City, the Mississippi above Keokuk, and the Ohio above Parkersburg had closed.

### ATMOSPHERIC ELECTRICITY.

The auroral display of the evening of November 1 and early morning of the 2d was observed in nearly every state from our northern boundary southward to Virginia and Missouri.

## ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure reduced to sea-level for November, 1893, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown by isobars on Chart II, which also gives the so-called prevailing winds, or those most frequently observed at each station.

The normal distribution for November of atmospheric pressure and the direction of the normal wind resultant for each station is shown on Chart V. This chart has been prepared by Prof. H. A. Hazen, who has also prepared all the others of this series preliminary to the publication by the Weather Bureau of specially prepared data and charts showing the meteorological and climatic features and conditions of the United States. The pressures for both Canada and the United States are reduced to sea-level but not to standard gravity by Prof. Hazen's methods and formulæ. The wind

resultants are as given by him at page 124 of his "Meteorological Tables," and are computed by Lambert's formula, giving equal weight to each observed wind without regard to its velocity.

As compared with the preceding month of October the mean pressure for November, 1893, was lower in New England and the Canadian Maritime Provinces, the maximum change being 0.08 at the mouth of the Saint Lawrence; pressure had also fallen in the extreme western part of the state of Washington, the maximum change being .04 at Fort Canby. In all sections of the country the mean for November was higher than for October, the maximum rise being 0.14 at Jupiter, Fla.; 0.11 at Omaha, Nebr., Des Moines, Iowa, and Columbia, Kans.; 0.14 at Winnemucca, Nev.; 0.15 at Battleford, Saskatchewan; and 0.16 at Medicine Hat, Assiniboia.

As compared with the normal for this month the pressures for November, 1893, have been slightly below the normal in

the valley of the Saint Lawrence, the Northwest, and the Lake region, the maximum depression being 0.09 at Port Arthur, Ont. Pressures have been slightly above the normal in California and New England.

#### HIGH AREAS.

I.—This area was central on the morning of the 1st in eastern Virginia, and is the continuation of high No. XIII of the month of October. On the 2d the ridge of highest pressure was in about the same locality, after which it merged into the tropical high of the Atlantic Ocean.

II.—On the 1st, in the morning, pressure was high off the coast of Oregon; the center moved rather rapidly southeastward over the Rocky Mountain plateau as a long ridge which steadily increased in length, so that on the morning of the 3d we have two high centers in Idaho and Illinois, respectively, and on the morning of the 4th three high centers are located in Utah, Texas, and Vermont, while, of course, in the whole intervening region pressure was above the normal. The morning of the 5th shows approximately the same distribution of pressure, but on the morning of the 6th the barometer had risen sufficiently to unite the areas of high pressure into one irregular shape, whose center was in West Virginia. During the next twenty-four hours pressure rose to the northward, and on the morning of the 7th the high center was in New Hampshire, after which it moved slowly southeast and disappeared on the 8th east of New England. The continuance of this high in the east Atlantic states during the 4th to the 7th may have given rise to low No. V, which seems to have been east of Florida on the 6th.

III.—On the 7th, in the morning, the pressure which had been rising on the 6th on the California coast had also risen over the Rocky Mountain plateau, and the central high was in Nevada. This central high disappears on the 9th in New Mexico.

IV.—On the 9th the pressure rose rapidly on the north Pacific slope in the rear of low No. VI, and was highest on the morning of the 10th at Portland, Oregon. Pressure continued to rise, and on the morning of the 11th the highest centers were in Washington and Wyoming, while high barometer prevailed over the Rocky Mountain plateau. An extensive cold wave prevailed on the eastern front of this high area, with rain or snow from Manitoba to Texas. On the morning of the 12th the highest pressure was in Nevada and Utah, and the front of the cold wave extended from southern Texas to Arkansas, Missouri, Illinois, Wisconsin, and Lake Superior. On the morning of the 13th pressure had risen on the northwestern side but had fallen on the southeastern side of the high area and the center was in Alberta, affording a remarkable illustration of the fact that when a layer of air is descending obliquely to the earth's surface, forming an area of high pressure, the central high will vary, from time to time, both as to location and pressure, depending on the characteristics of that layer. The movement of the central high is not a measure of the movement of the mass of air, as a whole, so long as the descent continues. On the morning of the 14th a high pressure covered the Rocky Mountain plateau and nearly all of the eastern and western slopes; highest pressures were central in Washington and in northwestern Texas during the day; high northeast and northwest winds prevailed on the Texas and Louisiana coasts, with light rain, and the conditions seemed favorable to the formation of whirlwinds on the Gulf, but the flow of cold, dry air seems to have annulled these, if any existed. On the morning of the 15th highest pressures were in southern Texas and Utah; it is difficult to understand the formation of the ridge that prevailed this morning from Oregon to Texas, unless we assume that the pressure of low area VII had fallen decidedly near the Mexican coast and Lower California. Frosts were reported

this morning from nearly all over Texas, Georgia, Alabama, Arkansas, Mississippi, and Louisiana. After this rise on the western Gulf pressure fell steadily; the highest was in Alabama and Georgia on the morning of the 16th, and in North Carolina on the morning of the 17th. Frosts prevailed in South Carolina, Georgia, Alabama, and northern Florida on the morning of the 16th, and were reported in North and South Carolina and Georgia on the morning of the 17th. In general the frosts that occurred in this area of high pressure occurred after the central highest pressure had reached Texas in its southward movement, and while it was moving eastward, on the 16th and 17th.

V.—After a slight fall, pressure began to rise again on the 16th on the coast of Oregon, and by the morning of the 17th the region of high pressure included two centers in British Columbia and eastern Manitoba, respectively. On the morning of the 18th the region of high pressure extended from British Columbia to Kansas, being highest in Wyoming and British Columbia. On the 19th, a. m., pressure was highest in Wyoming, having fallen somewhat on the Pacific coast. Frost was reported on the morning of the 17th in northern California, with cold, dry, destructive, northerly winds, as also on the 18th and 19th in the same region. The high pressure now moved more nearly southward, and on the morning of the 20th was central in Arizona, with light frost at San Diego, Cal. During the 19th the southeastern end of the original ridge developed into a separate high center which was on the 20th, a. m., in North Carolina, after which it disappeared off the middle Atlantic coast on the 21st. The direct southern movement of the western portions of this high area and the presence of the central high in Arizona on the morning of the 20th is to be correlated with the presence of a depression west of the Mexican coast, a remnant of which appears in Texas on the morning of the 22d.

VI.—While low No. X was central in the Lake region on the 22d, pressure rose decidedly over the Canadian Maritime Provinces, and a branch of the high pressure over the Atlantic pushed westward over Newfoundland, being apparently central in the Gulf of Saint Lawrence on the morning of the 22d, after which it disappeared.

VII.—On the 21st, a. m., pressure began to rise in British Columbia, Alberta, and Washington. On the 22d, a. m., the highest pressure may be located in Alberta, and on the 23d, a. m., a large area of high pressure extended from Athabasca to Kansas, separating the two well-marked lows (XII) on the Oregon coast and (X) on Lake Huron. On the 24th, a. m., the high pressure extended from the center of the Gulf of Mexico to the north of Manitoba, with three centers in Manitoba, Iowa, and Missouri. On the 25th, a. m., the highest pressure was in West Virginia, and heavy frost was reported at Cape Hatteras, N. C. 26th, a. m., the central highest pressure had risen appreciably and was in central Virginia, with a subsidiary center north of Lake Ontario. On the 27th, a. m., the highest pressure was central in Rhode Island, and on the 28th, a. m., near Cape Breton.

VIII.—On the 28th, a. m., pressure was rising in Assiniboia, while the depression No. XII b was central in Wyoming. On the 29th, a. m., the low area extended as a trough from Washington to Wyoming, while the high area extended as a ridge from Alberta to North Dakota and a system of steep gradients of pressure and temperature lay between these; this condition continued during the 29th, and an analogous system of steep gradients is seen on the map of the 30th, a. m., while the central highest pressure in Assiniboia had considerably increased. The subsequent history of this high pressure belongs to December.

#### LOW AREAS.

I.—This is a continuation of No. XIX of October, which on the 31st was moving southeastward over Manitoba. On



the morning of the 1st a general depression extended from Lake Superior to Kansas and Wyoming. A trough of low pressure, with opposing winds, extended from central Kansas to the eastern part of South Dakota, but the lowest pressure was apparently north of Lake Superior. The latter apparently filled up while the former moved northeastward over the Lake region, and on the 3d disappeared at the mouth of the Saint Lawrence.

II. On the 1st, in the afternoon, a depression was approaching Athabasca on the north side of high No. II, and on the 3d, in the afternoon, its center was located in the northern portion of Alberta and the pressure was rising in British Columbia. Its path was nearly eastward at the northern border of the Canadian stations, and at 6 a. m. it was apparently north of the Gulf of Saint Lawrence.

III.—On the 4th, in the afternoon, a depression was approaching the coast of British Columbia, and on the 5th, in the afternoon, it was apparently central on the border between that province and Alberta. On the morning of the 6th an extensive area of low pressure covered Alberta and Saskatchewan and on the afternoon of the 6th two low centers existed, one in British Columbia the other in North Dakota; the latter may be considered as an offshoot from the principal area from the north, and which was developing a remarkable tendency to stretch rapidly southward. The map of the 7th, a. m., shows the persistence of this tendency by the formation of the trough with subsidiary centres in western Kansas and southern Minnesota, while the principal low was central in Athabasca. On the 7th, p. m., the former depression had almost entirely filled up, there being only a slight deficit of pressure from Lake Superior to southern Texas.

IV.—As above stated, this is located in British Columbia on the 6th, and in Saskatchewan on the 7th, p. m. During the 8th this depression filled up and disappeared, but the barometer again fell decidedly on the coast of British Columbia, as described in low No. VI.

V.—In connection with high No. II, which was central on the 4th, a. m., in New England, an area of low pressure existed in the Gulf of Mexico during the 4th; probably this was a portion of a much larger depression extending over the Caribbean Sea and the West Indies. On the 5th and 6th a central low was apparently moving westward towards Florida, whose location can be approximately given on the afternoon of the 7th at N. 32°, W. 75°. By the morning of the 8th a well-defined disturbance was central near Cape Hatteras, and on the evening of the 9th the center was southeast of Cape Cod, after which it moved northeastward too far from the coast stations to be recognized.

VI.—A depression approached the coast of British Columbia on the 8th, the barometer was lowest at Spences Bridge, B. C., on the morning of the 9th, and on the evening of that day the pressure was low throughout Alberta, probably representing the southern end of a trough extending farther northward. This depression moved southeast, and was central on the morning of the 10th in South Dakota. During the 10th and 11th this trough stretched southward to Texas and filled up at its northern end, and although indefinite partial depressions continued until the 12th, yet no well-defined central low resulted—in fact, we may plausibly consider that the southern end of this depression was really the northern end of the area No. VII peculiar to the Mexican coast, as described in previous MONTHLY REVIEWS, and which during the current November has sometimes stretched northeastward, though not so frequently and decidedly as during September and October.

VII.—This number is given to the low pressure that extends from Arizona and northern Mexico to the south or southwest, and that has sometimes during November stretched as a

trough north or northeastward into the United States. Such extensions occurred as follows: On the 3d, p. m., a short arm reached into southern Texas; on the 9th, p. m., and 10th, a. m., this low extended northeastward so as to join low No. VI, and in fact constituted a trough or slight depression between the two high areas Nos. III and II that were over the Rocky Mountain plateau and the Atlantic coast, respectively; it maintained this position during the 11th, on which date, however, it became divided into separate low areas, respectively, on the Texas coast and north of Lake Huron. On the 16th and 17th pressure fell steadily from southern California to Texas, while the great high area, No. V, moved southeastward over the Rocky Mountain plateau, and, so far as observations are available, the daily maps render it plausible that a well-defined area of low pressure rather than a trough had advanced northeastward over Lower California toward Arizona. The map of the 17th, 8 p. m., would indicate that the area No. VII was at that time also an area of revolving winds central at the head of the Gulf of California, but if so this cyclonic system was broken up on the 18th and pressure rapidly recovered. On the 24th low No. XII, which was then central in Washington, extended southward to a temporary junction with No. VII, but this was broken up on the 25th. On the whole, therefore, this low area off the Pacific coast of Mexico has been far less prominent than during the preceding months, and the areas of high pressure that have moved eastward over the Pacific coast have frequently obliterated it entirely.

It is proper to consider the depression that we have called area No. VII as an extension, or branch northward, of the so-called equatorial depression which, as is well known, is not uniform in its position or character, owing to the irregularities of the earth's surface. Similarly, many of the depressions that appear on the northern borders of the United States as indentations in our isobars must be considered as extensions, or branches southward, of the general area of low pressure that occupies the Arctic regions. When such depressions make a temporary connection through northern Mexico and the central portions of the United States it is simply equivalent to the temporary disturbance of the atmospheric effort to establish a uniform and so-called tropical belt of high pressure from east to west along the parallels between N. 30° and N. 40°. This tropical belt of high pressure is almost permanently broken into eastern and western portions over the Atlantic and Pacific oceans, respectively, during the months of July and August. It is less frequently interrupted in May and June or September and October, and is sensibly continuous from ocean to ocean during November, December, January, February, March, and April.

VIII.—On the 11th, in the morning, a low area appears in Athabasca, while high No. IV prevailed over the Rocky Mountain plateau region. This depression extended rapidly southward, but its central lowest pressure was not within the limits of our stations until the 16th, and the track given on Chart I, therefore, generally represents only the position of the axis of a southern extension or branch from the larger depression to the northward. We are, therefore, not to consider the locations there given from the 12th to the 16th as the centers of cyclonic whirls, but as the axes of troughs of low pressure having northwesterly winds on the west and southeasterly winds on the eastern side; this trough extended farthest south on the 12th, when its southern end was almost isolated as a whirl over Lakes Michigan and Huron, but the complete development of such a cyclonic area was not consummated. The tendency to the formation of a special whirl over the lower lake region was renewed on the 15th, when, by reason of the fall of temperature with cold northwest winds, there was formed an area of snow over Lakes Huron, Erie, and Ontario, but by the morning of the 16th this had disappeared



and the principal low center was in the southern part of the Gulf of Saint Lawrence.

Illustrations of similar movements will frequently be found in the charts of the "Bulletin of International Meteorology," the study of which shows that well-defined cyclonic areas, after passing over a large portion of the north Pacific, merge into the general depression of the Arctic region and pass over Alaska and British America as troughs or V-shaped depressions having steep gradients on the southern side but low gradients on the northern side. These are perfectly analogous to the similar depressions that move eastward over the north Atlantic into Europe. Sometimes the southern apex of the V-shaped depression extends to N. 50°, or even N. 40°, in North America, while in Europe it generally reaches only to N. 70° or N. 60°, and sometimes to N. 50°. The Arctic isobar of 29.6 frequently has, on any given date, several southward extensions, as, for instance, November 7, 1883, when one reached into Manitoba, N. 50°, while another reached southward into central Germany, N. 50°, and still a third touched northern Corea at N. 60°. Within this area of 3,000 square degrees pressure was everywhere lower than 29.6; outside of this area the steepest gradients were in Siberia and the northwest Pacific and northeastern Europe, but the gentlest gradients were over the north Atlantic and North America. The upper air, which on all sides flows from the tropical highs into this Polar depression, being deflected into a spiral path around the North Pole, flows in a direction and with a speed that is feebly indicated by the surface winds, and carries with it numerous minor and incomplete whirls, and even belts of opposing winds, which also revolve intact around the Polar basin until they are broken up and are replaced by others. The international maps of November, 1883, afford numerous illustrations of this process, and the large region within the isobar 29.6 is there seen to be carried sometimes far southward into the north Atlantic, and occasionally also southward into the north Pacific, or at least into Bering Sea. The progress of one of these minor whirls, or extensions from the Polar depression, is undoubtedly far slower than that of the air which circulates within them. They describe their path at a rate of about 30 miles per hour, or 10° of a great circle per day, and would, therefore, if they maintained their integrity, pass entirely around the zone of N. 55° to N. 65° in about eighteen days. This rate of rotation about the meteorological pole is an important fundamental datum in the mechanics of the atmosphere.

IX.—From the 10th to the 15th high pressure area No. IV prevailed over the United States while an extensive low prevailed throughout the British Possessions to the northward. On the 14th, p. m., the barometer was falling at Athabasca, and apparently an area of low pressure having passed from the Pacific Ocean eastward over Alaska and the Rocky Mountains was now descending southeastward on the eastern side of that range. It was central in Minnesota on the afternoon of the 16th, after which its path turned from east-southeast to east-northeast, and on the morning of the 18th its center was apparently in Labrador north of our stations but with a tendency to move southward.

X.—A general depression followed close in the rear of No. IX, apparently located in Athabasca on the 19th, in the morning, and was central in Alberta on the 20th, a. m.; after passing southeast into Kansas and Iowa it turned to the east-northeast on the 21st. On the 22d the central low stretched eastward into a long oval, and the winds indicate a subsidiary whirl central over Maine on the afternoon of that date; the path of the latter northeastward into the Gulf of Saint Lawrence is shown by the winds but not by any special barometric depression.

XI.—Apparently the northwest winds in the rear of low No. X developed into a whirl off the New England coast after

the 23d, 8 p. m.; a special barometric depression was central on the 24th, a. m., near Halifax; this developed into a severe storm on the Atlantic which passed eastward just south of Newfoundland, on the 25th, a. m.

XII.—On the 21st and 22d the pressure rose steadily in Athabasca, Alberta, Saskatchewan, and southward over the Rocky Mountain plateau, forming a large area of high pressure with a rather low temperature and a slight preponderance of northerly winds, but by no means such as to suggest a special flow of cold air from the north. On the 22d pressure began to fall from northern California to British Columbia, and in such a way as to show that a well-developed revolving storm was moving northeastward towards Oregon and Washington. As the Rocky Mountain plateau prevented the flow of air at or near sea level from British America into this depression on the coast, and the consequent formation of a symmetrical whirl, therefore while the pressure was diminishing on the Pacific coast, with steady southwest wind and rain, the air over the interior of North America moved south and east along the eastern slope of the Rocky Mountains, forming high No. VII.

Thus the original low area No. XII was to a great extent broken up, and finally on the 25th, in the morning, was represented by an irregular depression having two centers, No. XIIb in Washington and No. XIIa in Montana, respectively, while the barometer continued high to the north of this depression. No. XIIa was central on the morning of the 25th in Montana but had expanded into an oval depression, with a third center, No. XIIc, to the southward in Colorado, and on the 26th, in the morning, the map showed a long trough with centers (No. XIIa) in Manitoba and (No. XIIc) in Texas, respectively. The former (No. XIIa) moved northward and disappeared probably by filling up; the latter (No. XIIc) became an important storm-center, as in fact is usually the case with the southern end of such a trough, or the southernmost of two depressions; it moved rapidly north-northeastward, was central in Michigan on the 27th, p. m., and disappeared in Labrador on the 29th.

The western part of the original depression, which we have called No. XIIb, withdrew westward to the coast of British Columbia during the 25th, but on the afternoon of the 26th its center was again in Washington, forming the western branch of an irregular depression that included Nos. XIIa and XIIc. The depression now stretched southeastward as an ill-defined oval, whose center on the morning of the 28th was in Wyoming, when it constituted the western nucleus of the depression that stretched from the Pacific coast to New England and included No. XIIc in its eastern portion. The southeastward movement continued until the 8 p. m. observation of the 28th, when it was central in eastern Kansas; it then moved northeastward over the Lake region and disappeared on the 30th at the mouth of the Saint Lawrence.

On the 28th while No. XIIb was moving southeastward a trough still connected it with the depression on the coast of Oregon, and the barometer still continued high in Alberta and Assiniboia. Out of this condition a new central depression (No. XIIId) developed, which was apparently in Wyoming on the 29th, 8 a. m. This moved southeastward and disappeared in northern Texas on the 30th in the afternoon.

The depression that was almost permanently present during the summer months south of Arizona, and which we have called No. VII, has not been conspicuous during November, its principal appearance being on November 17th, as above narrated, and on November 24th, when it temporarily united with the depression on the coast of Oregon. On the other hand, the depressions that have appeared at the north-western corner of our map must be considered as the south-eastward extensions of the depression that prevails on the



north Pacific in the winter time, and that has during the latter half of the current month been a prominent feature. The general circulation of the atmosphere has now gone through the autumnal change and has taken on most of the features that characterize its condition in the winter months.

*Movements of centers of areas of high and low pressures.*

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
<b>High areas.</b>										
I.....	1, a. m.	38	77	2, a. m.	36	78	Miles.	Days.	Miles.	Miles.
II.....	1, a. m.	48	124	8, a. m.	42	69	4,000	7-0	571	24
III.....	6, a. m.	37	123	9, a. m.	34	104	1,300	3-0	433	18
IV.....	10, a. m.	47	126	17, a. m.	36	27	5,100	7-0	727	30
V.....	16, a. m.	42	125	21, a. m.	38	73	3,900	5-0	780	32
VI.....	22, a. m.	47	63							
VII.....	22, a. m.	54	114	28, a. m.	46	60	3,500	6-0	583	24
VIII.....	28, a. m.	53	115	30, p. m.	49	104	600	2-5	240	10
Sums.....							18,400	30-5	3,334	
Mean of 6 paths.....									356	23.2
Mean of 30.5 days.....									603	25.1

*Movements of centers of areas of high and low pressures—Continued.*

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
<b>Low areas.</b>										
I.....	31, p. m.	52	92	3, a. m.	29	70	2,500	2-5	1,000	42
II.....	3, p. m.	54	112	6, a. m.	51	64	2,100	2-5	840	35
III.....	4, p. m.	49	130	7, a. m.	41	99	1,900	2-5	760	32
IV.....	6, p. m.	53	124	7, p. m.	54	108	750	1-0	750	31
V.....	6, p. m.	23	73	12, a. m.	40	40	2,550	5-5	485	19
VI.....	8, p. m.	53	129	10, a. m.	39	101	1,500	1-5	1,000	42
VII.....										
VIII.....	11, a. m.	57	114	17, a. m.	49	52	3,000	6-0	500	21
IX.....	14, p. m.	55	110	18, p. m.	39	56	2,600	4-0	650	27
X.....	20, a. m.	51	112	23, p. m.	50	73	2,500	3-5	715	30
Xa.....	22, p. m.	46	69	23, a. m.	48	53	800	0-5		
XI.....	23, p. m.	41	67	25, a. m.	46	53	1,000	1-5	667	28
XII.....	22, a. m.	41	128	24, p. m.	42	122	700	2-5	280	12
XIIa.....	24, p. m.	49	132	26, p. m.	50	94	1,600	2-0	800	33
XIIb.....	26, p. m.	49	124	30, a. m.	49	66	3,400	3-5	971	45
XIIc.....	28, a. m.	45	107	29, a. m.	52	63	3,700	4-0	925	39
XIId.....	29, a. m.	43	106	30, p. m.	33	97	900	1-5	600	25
Sums.....							31,500	44-5	10,923	
Mean of 15 paths.....									728	30-3
Mean of 44-5 days.....									711	29-6

**NORTH ATLANTIC STORMS FOR NOVEMBER, 1893.**

[Pressure in inches and millimeters; wind-force by Beaufort scale.]

The paths of storms that passed over the western portion of the north Atlantic Ocean are shown on Chart I, so far as can be traced from information received up to the 25th of December, through the co-operation of the Hydrographic Office, U. S. Navy, and the "New York Herald Weather Service."

The normal pressure for November, as shown by the international simultaneous observations, is about 30.00 (762) throughout the north Atlantic Ocean between the 10th and 15th parallels of north latitude; north of this a zone of 30.10 (764), or more, extends from Algeria westward over the United States into the Pacific; north of this latter zone pressure diminishes steadily, and the areas of lowest pressure are a narrow oval including Iceland and North Cape and a second oval extending from Alaska westward to Corea; in both these areas pressure is 29.60 (752), or less.

As compared with the annual normal pressure for the Northern Hemisphere the monthly normals for November show a deficiency of .05 in the central portion of the north Atlantic Ocean, as also over Great Britain and Scandinavia, but an excess of .05, or more, over the United States and of .10 over Alaska.

The tracks of storms for November may be classified as principally those that move southeastward from Alaska to the Lake region, thence eastward to Newfoundland, and thence northeast to northern Europe.

The region of greatest frequency of storm-centers extends from Lake Superior eastward over the Gulf of Saint Lawrence, where an average of 5 tracks per month cross over each space of 5° in latitude and longitude during November. Comparatively few storm-centers pass from the West Indies north or northwest to the American coast.

The average velocity of movement of storm-centers for November in statute miles per hour is 31 when moving eastward along the northern border of the United States and 21 for the Atlantic Ocean between Nova Scotia and Great Britain. The simultaneous charts of the Northern Hemisphere for 1878 to 1887 show that during these ten years only one storm in the month of November was traced across both the

North American continent and the north Atlantic Ocean, and again only one storm was traced across both the north Atlantic and Europe.

During November, 1893, the following storms have been traced over portions of the north Atlantic Ocean; the centers are located for Greenwich noon by international simultaneous observations as follows:

A. This appeared off the Straits of Belle Isle November 1, and after moving southeast to N. 50°, where it was nearly stationary on the 3d and 4th, was broken up on the 5th in W. 35°.

B. This developed southeast of Nova Scotia on the 4th in connection with the low pressure that was then in Labrador; it moved northeastward to about N. 50°, W. 40° on the 6th, and then turned more decidedly northward and disappeared on the 7th at N. 55°, W. 39°, possibly for the want of marine records in this region, while an area of high pressure was central east of this region, extending to Great Britain and Norway.

C. This storm appears from the latest records to have been central on the 7th at N. 42°, W. 50°, and on the 8th at about N. 45°, W. 40°. By this time this was a large and well-marked whirl of wind; the centers of the surrounding high pressures were respectively over New England and the region between Ireland and Iceland. The center moved nearly due north and on the 9th was at N. 51°, W. 41°, after which the depression had moved northward beyond our stations and, apparently, partly filled up by the 10th.

D. This is depression No. V in the list of American low areas and may be located on the 6th north of Cuba; after this date it steadily developed both as a whirl and as a low pressure with increasing winds; its path lay northeastward a short distance from the United States coast, while areas of high pressure were central northwest of it over the continent, Lake region, middle, and the east Atlantic states, and southeast of it on the Atlantic Ocean. On the 10th it was in N. 39°, W. 55°, and on the 11th in N. 41°, W. 46°; at this date an area of high pressure was central in northern Ireland and Scotland and another in New England, while the pressure between N. 20° and N. 40° throughout the middle portion

of the north Atlantic was decidedly below the average; easterly gales prevailed from the English Channel and Irish Sea eastward to W. 30° and southeasterly gales between W. 30° and 40°; northerly gales prevailed from Newfoundland southward to N. 30°, the whole constituting a very extensive whirl around the storm-center as above located for this date; there are also evidences of the beginning of an independent whirl south of the principal one.

On the 12th the lowest pressure apparently extended as a long oval northwest and southeastward, with its center at N. 40° and W. 40°. At noon of the 13th the map shows a large area of pressure 29.5 or less, the center being as before, N. 40°, W. 40°, but the barometer had now fallen decidedly over England, the highest pressure had been rapidly transferred to southern Germany, and pressure had also fallen over the Atlantic States and Canadian Provinces. At noon of the 14th the center of lowest pressure and revolving winds was at N. 43°, W. 36°, and at noon of the 15th the low pressure extended as a trough northeast and southwest between N. 40° and N. 50°, the center being at N. 45° and W. 30°, but subsidiary and minor depressions were at this time also central in northern Scotland, France, and northern Russia. On the 16th pressure had recovered over northern and central Europe, but low pressures with attending whirlwinds were central west of Ireland at N. 52°, W. 18°, and on the western portion of the Atlantic in connection with the low center over the Gulf of Saint Lawrence.

From this date, during the 17th, 18th, and 19th, a continuous gale, sometimes of hurricane force, prevailed on the European coast; in the English Channel southeast winds prevailed on the 16th, west winds on the 17th, and northwest on the 18th and 19th, which, by the 20th, had veered to northeast with clearing weather and high pressure; the lowest pressure was central on the 17th at N. 56°, W. 4°; on the 18th at N. 54°, E. 3°, and also at N. 44°, E. 8°; on the 19th at N. 53°, E. 9°, and also at N. 45°, E. 11°; on the 20th at N. 49°, E. 11°, and also N. 43°, E. 12°. On the 21st these latter low pressures had filled up and others had developed in northern and central Russia, respectively.

While this extensive storm area was thus, on the 16th to the 20th, moving slowly eastward through western Europe and while an extensive depression was moving down the Saint Lawrence Valley the pressure rose steadily over the Atlantic Ocean between N. 10° and N. 60°, W. 10° and W. 50°; although a belt of high pressure was thus made to prevail from the south Atlantic states to Algeria yet it may be an open question whether the barometric rise north of this zone should be considered as due to a bodily movement of the zone northward; although southerly winds prevailed for a time in the eastern portion of the Atlantic yet by noon of the 20th the pressure was higher between N. 45° and 60° than it was to the southward, and on the 21st the central highest pressure (30.6 to 30.7) extended from Ireland westward to W. 35°, so

that the growth, the location, and the movements of this area of high pressure which, in fact, continued nearly stationary until the 24th, must be attributed to a general descending current over this portion of the Atlantic precisely similar to the descending high pressure areas of the North American continent.

E. From the 16th to the 23d several low areas passed over Labrador to the Atlantic Ocean north of our marine reports and evidently pursued a northeasterly course toward Greenland and Iceland, keeping on the northern side of the general area of high pressure just described; on the 24th the low area No. XI of the American series was off the New England coast, and on the 25th it was central in the Gulf of Saint Lawrence; this also moved northeastward over Labrador beyond our stations and kept to the north of the above-mentioned high area. On the 28th the American area of low pressure No. XIIc passed down the Saint Lawrence Valley and on the 29th passed northeastward over Labrador and remained beyond the limit of our reports. While these several low areas were thus pursuing extreme northerly paths and while high pressure prevailed from Great Britain southwest and west the pressure remained permanently low in the northern part of Norway and this low area undoubtedly extended westward to southern Greenland.

#### OCEAN ICE IN NOVEMBER.

The limits of the regions within which field ice or icebergs were reported for November, 1893, are shown on Chart I by crosses.

The southernmost ice, reported on the 13th, was in N. 50° 40', W. 54° 13', and the easternmost ice, reported on the 2d, in N. 52° 51', W. 52° 20'. The ice of the current month was noted on two dates in the Straits of Belle Isle, and six high bergs were reported eastward from the Straits.

No Arctic ice was reported for November, 1892. In November, 1891, an iceberg was observed in N. 51° 58', W. 55° 35', on the 8th. In November, 1890, a small piece of ice was noted in N. 46° 35', W. 47° 51'. In November, 1882, 1883, 1887, and 1888, no ice was reported near Newfoundland and the Grand Banks. In November, 1884 and 1889, several icebergs were seen over the eastern part of the Banks of Newfoundland. On one date in November, 1885, and one date in November, 1886, ice was observed south of the 50th parallel.

#### OCEAN FOG IN NOVEMBER.

The limits of fog belts west of the 40th meridian, as determined by reports of shipmasters, are shown on Chart I by dotted shading. Near the Grand Banks of Newfoundland fog was reported on 8 dates; between the 55th and 65th meridians on 3 dates; and west of the 65th meridian no fog was reported. Compared with the corresponding month of the last 6 years the dates of occurrence of fog near the Grand Banks numbered 2 less than the average; between the 55th and 65th meridians the same as the average.

#### TEMPERATURE OF THE AIR (expressed in degrees Fahrenheit).

The distribution of the monthly mean temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart II; the lines are, however, not drawn for the higher irregular surface of the Rocky Mountain plateau; the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country over which they are drawn; in mountainous regions such isotherms would be controlled largely by the topography, and it is, therefore, not practicable to present the temperature data in this manner unless a contour map on a large scale is published as a base chart.

In the table of meteorological data from voluntary observers the actual mean temperature is given for each station, and in the tables of climatological data for the regular stations of the Weather Bureau both the mean temperatures and the departures from the normal are given. In the latter table the stations are grouped by geographical districts, for each of which is given the average temperature and departure from the normal. The normal for any district or station may be found by adding the departures to the current average when the latter is below the normal and by subtracting when it is above.



For regular stations of the Weather Bureau the monthly mean temperature is the simple mean of all daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to the table of meteorological data.

During November, 1893, the mean temperature was highest in southern Florida and at Key West, where it was from 70 to 75; it was lowest in Saskatchewan, being 11.1 at Prince Albert and 13.4 at Battleford. The temperature averaged 32 along a zone running from central Maine southwest to central Vermont, thence northwest just north of Lake Huron through the southern part of Lake Superior southward to the southern part of Wisconsin, thence to northern Iowa, central South Dakota, the southern boundary of Wyoming, southern Idaho, northern Idaho, and central British Columbia.

## DEPARTURES FROM NORMAL TEMPERATURE.

As compared with the normal for this month the mean temperature for November, 1893, was in excess 0.4 at Key West, and from 0 to 1.7 in Maine, the Canadian Provinces, the Saint Lawrence Valley, and the northern portion of the Lake region; elsewhere the temperature has generally been deficient, the maximum deficiencies being 3.5 at Baltimore, Md.; 3.0 at Lynchburg, Va.; 3.8 at Fort Smith, Ark.; 3.1 at Springfield, Mo., and Davenport, Iowa; 3.2 at Springfield, Ill.; 3.5 at Cincinnati, Ohio; 3.7 at Louisville, Ky.; 5.7 at Qu'Appelle, Assiniboia; 7.4 at Medicine Hat, Assiniboia; 8.1 at Calgary, Alberta; 9.4 at Edmonton, Alberta; 4.3 at Olympia, Wash.; 2.7 at Yuma, Ariz., and Los Angeles, Cal.; 3.0 at Tucson, Ariz.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for November for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for November, 1893; (4) the departure of the current month from the normal; (5) the extreme monthly means for November during the period of observation and the years of their occurrence:

State and station.	(1) Normal for the month of Nov.	(2) Length of record.	(3) Mean for Nov., 1893.	(4) Departure from normal.	(5) Extreme monthly means for November.			
					Highest.	Year.	Lowest.	Year.
<i>Arizona.</i>	6	Years	6	0	0		0	
Fort Apache .....	43.4	22	43.6	+ 0.2	48.1	1873	38.5	1880
Fort Mohave .....	59.9	21	56.7	- 3.2	66.2	1873	53.4	1880
Whipple Barracks .....	43.7	21	40.4	- 3.3	48.4	1875	36.1	1886
<i>Arkansas.</i>								
Keeseee Ferry .....	47.2	11	45.6	- 1.6	51.2	1830	44.1	1889
<i>California.</i>								
Riverside .....	57.7	11	53.7	- 4.0	59.7	1884	53.7	1893
<i>Colorado.</i>								
Las Animas .....	37.2	10	37.1	- 0.1	42.6	1892	29.4	1889
<i>Florida.</i>								
Merritts Island .....	67.9	11	68.1	+ 0.2	73.3	1883	60.0	1885
<i>Georgia.</i>								
Forsyth .....	56.6	18	57.8	+ 1.2	61.7	1874, 90	51.0	1880
<i>Idaho.</i>								
Boise Barracks .....	38.9	19	37.6	- 1.3	45.8	1885	31.5	1880
Fort Sherman .....	36.2	9	34.2	- 2.0	42.6	1890	25.4	1886
<i>Indiana.</i>								
Lafayette .....	39.6	10	38.6	- 1.0	44.6	1890	36.6	1892
<i>Iowa.</i>								
Cresco .....	48.7	21	49.5	+ 0.8	54.7	1878	19.2	1880
<i>Kansas.</i>								
Eureka Ranch .....	39.7	10	37.1	- 2.6	44.7	1885	30.3	1887
Independence .....	43.9	21	41.8	- 2.1	50.7	1878	33.6	1880
<i>Louisiana.</i>								
Grand Coteau .....	59.6	11	57.8	- 1.8	64.0	1883	56.2	1889
<i>Maine.</i>								
Orono .....	34.0	23	33.7	- 0.3	38.6	1889	27.1	1875
<i>Maryland.</i>								
Cumberland .....	40.0	22	39.0	- 1.0	44.7	1883	35.0	1880
<i>Michigan.</i>								
Kalamazoo .....	37.1	17	36.5	- 0.6	43.4	1890	27.0	1880
<i>Missouri.</i>								
Sedalia .....	43.3	10	41.4	- 1.9	46.7	1887	38.5	1891
<i>Montana.</i>								
Fort Custer .....	33.2	14	31.7	- 1.5	39.9	1890	24.5	1880

## Departures from normal temperature—Continued.

State and station.	(1) Normal for the month of Nov.	(2) Length of record.	(3) Mean for Nov., 1893.	(4) Departure from normal.	(5) Extreme monthly means for November.			
					Highest.	Year.	Lowest.	Year.
<i>Nebraska.</i>								
Fort Robinson .....	35.9	9	35.4	- 0.5	40.7	1885	31.8	1886
Genoa (near) .....	33.7	17	34.4	+ 0.7	39.8	1890	22.6	1880
<i>Nevada.</i>								
Browns .....	41.2	21	39.7	- 1.5	46.7	1891	25.8	1880
Carson City .....	37.7	16	39.7	+ 2.0	42.2	1885	31.4	1881
<i>New Hampshire.</i>								
Hanover .....	34.1	22	34.7	+ 0.6	37.1	1877	24.8	1873
<i>New Mexico.</i>								
Deming .....	54.2	12	57.0	+ 2.8	61.2	1892	47.2	1881
<i>New York.</i>								
Fort Wingate .....	39.6	22	35.0	- 4.6	44.4	1891	31.4	1880
<i>North Carolina.</i>								
Cooperstown .....	34.9	22	35.0	+ 0.1	38.5	1876, 77	26.8	1873
Plattsburg Barracks .....	34.4	22	35.2	+ 0.8	39.0	1889	25.3	1873
<i>North Carolina.</i>								
Lenoir .....	45.1	21	44.0	- 1.1	49.8	1890	39.9	1872
<i>Oklahoma.</i>								
Fort Reno .....	47.6	10	48.6	+ 1.0	51.5	1885	42.7	1889
Fort Sill .....	47.8	21	46.4	- 1.4	52.9	1879	36.6	1880
Fort Supply .....	44.2	12	41.4	- 2.8	48.8	1885	39.2	1889
<i>Oregon.</i>								
Bandon .....	49.3	9	49.0	- 0.3	52.0	1891	43.0	1886
<i>Pennsylvania.</i>								
Dyberry .....	34.7	20	35.0	+ 0.3	38.3	1883	24.9	1878
Grampian .....	35.3	22	34.1	- 1.2	39.2	1890	29.3	1872
Wellsboro .....	38.0	14	33.5	- 4.5	41.4	1885	33.5	1893
<i>South Carolina.</i>								
Statesburg .....	53.6	12	52.5	- 1.1	58.2	1890	51.2	1891
<i>South Dakota.</i>								
Fort Sully .....	30.5	22	33.2	+ 2.7	39.2	1878	21.1	1880
<i>Texas.</i>								
Austin .....	57.6	21	56.8	- 0.8	63.2	1883	46.0	1880
Silver Falls .....	49.6	7	49.1	- 0.5	52.4	1890	45.3	1889
<i>Utah.</i>								
Terrace .....	35.8	21	37.1	+ 1.3	46.0	1885	24.1	1880
<i>Vermont.</i>								
Strafford .....	33.4	20	33.7	+ 0.3	37.9	1886	23.4	1873
<i>Virginia.</i>								
Dale Enterprise .....	46.2	13	39.7	- 6.5	49.6	1888	39.7	1893
<i>Washington.</i>								
Fort Townsend .....	43.2	18	40.1	- 3.1	47.3	1884	39.2	1880
<i>West Virginia.</i>								
Parkersburg .....	46.0	12	41.5	- 4.5	55.7	1881	40.1	1886
<i>Wisconsin.</i>								
Madison .....	33.2	15	32.6	- 0.6	38.4	1890	27.3	1872
<i>Wyoming.</i>								
Fort Washakie .....	27.3	9	27.3	0.0	34.5	1890	10.1	1880

## TEMPERATURE, JANUARY TO NOVEMBER, 1893.

For the period, January 1st to November 30th, the average temperature was about normal in the west Gulf states. In districts where the temperature was in excess the average excess above the normal was as follows: extreme northwest, 0.5; southern Rocky Mountain slope, 1.3.

In regions where the temperature was deficient the average deficit for this period was: New England, 1.3; middle Atlantic states, 1.3; south Atlantic states, 0.7; Key West, Fla., 0.5; east Gulf states, 0.4; west Gulf states, 0.1; Ohio Valley and Tennessee, 0.8; lower lake region, 0.9; upper lake region, 0.7; extreme northwest, 0.5; upper Mississippi valley, 1.3; Missouri Valley, 0.8; northern slope, 1.3; middle slope, 1.0; southern slope, 1.3; southern plateau region, 0.4; middle plateau region, 1.7; northern plateau region, 2.9; north Pacific slope, 2.3; middle Pacific slope, 1.9; south Pacific slope, 1.5.

## YEARS OF HIGHEST MEAN TEMPERATURE FOR NOVEMBER.

The mean temperature for November, 1893, does not seem to have been the highest on record at any of the regular stations of the Weather Bureau.

The highest mean temperature for November generally occurred east of the Mississippi River and south of the Ohio River, in the Northwest, and along the middle and south Pacific coasts in 1890; over the middle and northern plateau regions in 1885; over the lower lake region, Pennsylvania, and New York in 1883; along the middle Atlantic and south New England coasts in 1881; in the west Gulf states in 1879; over the upper lake region and in the middle Missouri valley in 1878.

## YEARS OF LOWEST MEAN TEMPERATURE FOR NOVEMBER.

The mean temperature for November, 1893, was the lowest on record at Fresno, Cal., the average being 52.8, or 2.6 below the normal; the previous lowest was 54.1 in 1889.

The lowest mean temperature for November occurred in the Southwest in 1889; on the north and south Pacific coasts in 1886; on the middle Pacific coast in 1882; and from the Alleghany Mountain range over the central valleys, the Lake region, and the Rocky Mountain and plateau regions in 1880.

## MAXIMUM TEMPERATURE.

The highest temperatures recorded for November at regular stations of the Weather Bureau are given in the table of climatological data, from which the following are selected: Key West, Fla., 83 on the 21st; Jupiter, Fla., 85 on the 23d; Tampa, Fla., 85 on the 4th; Titusville, Fla., 83 on the 22d; Jacksonville, Fla., 84 on the 5th; Corpus Christi, Tex., 86 on the 8th; Abilene, Tex., 86 on the 1st; San Antonio, Tex., 85 on the 2d; Yuma, Ariz., 86 on the 8th; Tucson, Ariz., 84 on the 1st; San Diego, Cal., 84 on the 14th; Los Angeles, Cal., 86 on the 14th; Eastport, Me., 60 on the 3d; Northfield, Vt., 60 on the 2d; Duluth, Minn., 61 on the 7th; Saint Vincent, Minn., 58 on the 7th; Havre, Mont., 64 on the 5th; Tatoosh Island, Wash., 53 on the 18th and 56 on the 7th.

## MINIMUM TEMPERATURE.

The lowest temperatures recorded at Weather Bureau stations are shown in the table of climatological data, from which the following are selected: Saint Vincent, Minn., -24 on the 29th; Havre, Mont., -16 on the 30th; Moorhead, Minn., -20 on the 24th; Bismarck, N. Dak., -15 on the 30th; Miles City, Mont., -14 on the 30th; Northfield, Vt., +2 on the 27th; Eastport, Me., +12 on the 27th; Jacksonville, Fla., 32 on the 25th; Mobile, Ala., and Pensacola, Fla., 32 on the 24th; Corpus Christi, Tex., 30 on the 24th; Key West, Fla., 64 on the 25th; Yuma, Ariz., 32 on the 19th.

## DAILY AND MONTHLY RANGES OF TEMPERATURE.

The greatest daily range of temperature is given for each station in the table of climatological data for Weather Bureau stations. The extreme monthly ranges were 87 at Moorhead, Minn.; 85, Huron, S. Dak.; 82, Valentine, Nebr.; Bismarck, N. Dak., and Saint Vincent, Minn.; 84, Saint Paul, Minn. Among the smaller monthly ranges were 19 at Key West, Fla., and Tatoosh Island, Wash.; 24, Fort Canby, Wash.; 36, Galveston, Tex., and New York, N. Y.; 37, Harrisburg, Pa., and Nantucket, Mass.

## LIMITS OF FREEZING TEMPERATURE.

The southern limit of the region within which the air has had a freezing temperature at some time during the month is approximately shown by the full and dotted lines on Chart VI joining the places at which the minimum temperatures of 32 and of 40, respectively, occurred within the instrument shelters of the Weather Bureau; the latter minimum is usually accompanied by a more or less severe frost on the ground outside of the shelter. During November, 1893, the line of minimum 40 extended from a short distance below Jacksonville, Fla., southwestward across the peninsula to Tampa; it reappears again on the Louisiana coast south of New Orleans and follows the coast to Corpus Christi, Tex.; it reappears on the Pacific coast at San Diego, Cal., and follows the coast line to some point north of San Francisco, Cal.

## FROST.

The reports of frosts injurious to vegetation are as follows: 4th, Parker, Ariz., vegetables killed. 12th, Wilgus, Ariz., vegetation killed. 15th, Alexandria, La., buds on sugar cane killed; Plant City, Fla., tender vegetation killed on lowlands. 19th, Oracle, Ariz., tomato vines killed. 24th, Society Hill, S. C., tender vegetation killed; Alexandria, La., most of the

cane killed. 25th, in northern Florida, plants and vegetables damaged.

The following table shows the dates of the occurrence of the first light frost, the first heavy frost, and the first snow-fall at the respective stations:

*Dates of first light and heavy frosts and snow, November, 1893.*

State and station.	First frost.			State and station.	First frost.		
	Light.	Heavy.	Snow.		Light.	Heavy.	Snow.
<b>Alabama.</b>				<b>Colorado—Continued.</b>			
Bermuda		15		Rocky Ford			11
Elba		16		Scissors			10
Eufaula		16		Surface Creek			18
Greensboro		15		T. S. Ranch			18
Mobile		16		Twin Lakes			11
Newberg			14	Wallet			21
Starlington		16		Wilde			11
Thomasville		15		Yuma			10
<b>Arizona.</b>				<b>Connecticut.</b>			
Dudleyville		13		Bridgeport			15
Holbrook			23	Falls Village			4
Natural Bridge		29		Greenfield Hill			15
Oracle		19		Hartford			4
Parker		4		Middletown			15
Rye		21		New Hartford			15
Saint Helenas Ranch		18		New Haven			15
Show Low			20	New London			15
Signal		1		Wallingford			15
Tucson		20		Waterbury			1
Walnut Ranch			20	West Simsbury			4
Yuma		20		<b>Delaware.</b>			
<b>Arkansas.</b>				Millsboro			24
Ashdown		15		Kirkwood			15
Conway		15		Seaford			15
Kirby		14		<b>District of Columbia.</b>			
Osark		13		Washington			15
Stuttgart		15		<b>Florida.</b>			
Winslow		13		Amelia			16
<b>California.</b>				Archer			16
Anderson		1		Brooksville			16
Citrus			16	Federal Point			25
Crescent City		17	21	Green Cove Springs			15
Edmonton			25	Jacksonville			16
Eureka		17		Lake City			16
Folsom City		10		Moseley Hall			16
Fresno		16	18	Orlando			16
Georgetown		17		Oxford			25
Gridley			3	Pensacola			16
Hydesville		15	17	Plant City			16
Independence			17	<b>Georgia.</b>			
Iowa Hill		17		Blakely			16
Jackson		16		Brag			16
Julian		18	16	Camilla			16
Keeler		25	17	Clayton			1
Mariposa		18	17	Darien			25
Napa		2		Fleming			16
Nordhoff		12	18	Hawkinsville			25
Oakdale		11		Homerville			16
Oleta		10	18	Lumpkin			16
Pasadena		18		McArthur			1
Pomona		20		Newnan			16
Red Bluff			19	Piscola			16
Sacramento			19	Poulan			16
San Ardo			18	<b>Illinois.</b>			
San Bernardino		16	17	Atwood			21
San Diego		20		Aurora			21
San Jacinto			11	Bloomington			21
Santa Maria		18		Braidwood			15
Shasta			26	Bushnell			21
Susanville			23	Chicago			15
Tulare		18		Cordova			30
Ukiah		2	18	Dixon			21
Upper Mattole		12	15	East Peoria			21
Vacaville			19	Fort Sheridan			21
West Butte		19		Galva			21
Wheatland			19	Griggsville			21
Willows			16	Havana			21
Winchester			17	Lugrange			21
<b>Colorado.</b>				Louisville			20
Abbott			9	Martinsville			23
Arboles			17	Mattoon			18
Avoca			10	Mount Pulaski			21
Brush			11	Olney			26
Castle Rock			10	Oregon			21
Cheyenne Wells			22	Oswego			21
Collbran			25	Ottawa			15
Cope			10	Palestine			23
Delta			17	Paris			30
Divide Exper. Station			10	Peoria			21
Eastdale			10	Quincy			21
Gold Hill			10	Rantoul			14
Grand Junction			17	Riley			21
Gunnison			6	Rockford			15
Julesburg			10	Rushville			20
Kirk			21	Springfield			21
Lamar			10	Streator			13
Leslie			7	Sycamore			21
Loveland			21	Walnut			21
McCoy			7	Warsaw			21
Middle Box Elder			21	Winnebago			21
Monte Vista			11	<b>Indiana.</b>			
Parachute			18	Angola			15
Paonia			26	Ashboro			26
Pueblo			17	Cambridge City			15



## Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost.			State and station.	First frost.		
	Light.	Heavy.	Snow.		Light.	Heavy.	Snow.
<i>Indiana—Continued.</i>				<i>Kansas—Continued.</i>			
Connersville			15	Kiowa			12
Crawfordsville			25	Lakin			22
Columbia City			15	Lebo			11
Delphi			21	Leoti			20
Farmland			15	Liberal			11
Franklin			15	Macksville			11
Huntington			21	Manhattan			11
Indianapolis			15	Marion			15
Kokomo			23	Medicine Lodge			11
Lafayette			15	Minneapolis			11
Logansport			15	Morland			9
Marion			15	Morton			15
Maury			15	Monument			22
Muncie			15	Mount Hope			11
Rockville			23	Oberlin			11
Valparaiso			20	Rome		13	
Worthington			23	Sharon Springs			10
<i>Indian Territory.</i>				Sterling			22
Purcell		5		Topeka			29
<i>Iowa.</i>				Tribune			11
Algona			11	Utica			22
Alta			11	Wa Keeney			10
Amana			30	Wallace			22
Ames			12	Wamego			11
Atlantic			12	Winona			10
Audubon			10	<i>Kentucky.</i>			
Belle Plaine			12	Mount Sterling			23
Bonaparte			12	Sandy Hook			23
Carroll			11	<i>Louisiana.</i>			
Cedar Falls			21	Abbeville		15	
Cedar Rapids			19	Alexandria		16	
Centerville			12	Cameron		14	
Charles City			12	Cheneyville		15	
Clarinda			12	Davis		15	
Clinton			21	Donaldsonville		16	
College Springs			29	Grand Coteau		15	
Corning			11	Hammond		15	
Cresco			11	Houma		15	
Davenport			12	Jeanerette		15	
Decorah			21	Lafayette		15	
Delaware			24	Lake Charles		7	
Des Moines			12	Maurepas		15	
Dubuque			11	Melville		15	
Elkader			26	New Iberia		15	
Emmettsburg			11	New Orleans		16	
Fort Madison			21	Rayne		14	
Galva			11	Roseland		15	
Greenfield			11	Schriever		22	
Grinnell			11	Shreveport		15	
Grundy Center			11	Winnaboro		24	
Hampton			11	<i>Maine.</i>			
Hopeville			24	Bar Harbor		15	
Humboldt			21	Belfast		15	
Independence			21	Calais		15	
Indianola			24	Cornish		15	
Iowa City			21	Easton		15	
Iowa Falls			11	Eastport		16	
Jefferson			25	Farmington		15	
Keokuk			21	Fort Kent		6	
Keosauqua			12	Gardiner		15	
Knoxville			12	Houlton		15	
Larrabee			11	Lewiston		15	
Mason City			11	Portland		15	
Maxon			12	<i>Maryland.</i>			
Mechanicsville			21	Bachmans Valley		15	
Monticello			21	Baltimore		15	
Newton			12	Barron Creek Springs		24	
Onaga			11	Chestertown		15	
Onkalosa			29	Cumberland		21	
Ovid			12	Darlington		14	
Panama			11	Denton		15	
Richland			12	Fallston		15	
Rock Rapids			11	Fenby		15	
Sibley			19	Frederick		19	
Sioux City			11	Mount Saint Marys		14	
Spirit Lake			11	New Market		14	
Storm Lake			11	Solomons		24	
Tipton			21	Sunnyside		15	
Vinton			12	Valley Lee		24	
Webster City			24	Woodstock		14	
Williams			11	<i>Massachusetts.</i>			
<i>Kansas.</i>				Amherst		19	
Abilene			11	Bedford		16	
Achilles			11	Beverly Farms		10	
Allison			11	Blue Hill		21	
Atchison			29	Boston		15	
Beloit			11	Chestnut Hill		15	
Bucklin			11	Concord		5	
Cawker City			11	Dudley		4	
Colby			11	East Templeton		4	
Coldwater			9	Egg Rock, Nahant		30	
Cunningham		14		Fiskdale		4	
Hodge City			11	Fitchburg		4	
Downs			11	Gilbertville		19	
Engelwood			11	Hadley		5	
Eureka Ranch			22	Hingham		20	
Garden City			11	Lawrence		20	
Gove			11	Leeds		15	
Grainfield			10	Leicester		4	
Grinnell			22	Leominster		4	
Hays City			22	Mansfield		20	
Horton			29	Milton		20	
Hutchinson			11	Monson		4	

## Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost.			State and station.	First frost.		
	Light.	Heavy.	Snow.		Light.	Heavy.	Snow.
<i>Massachusetts—Cont'd.</i>				<i>Missouri—Continued.</i>			
Mount Nonotuck			4	Marshall			12
Nantucket			20	New Boston			12
North Billerica			19	New Hartford			29
Plymouth			20	Oakfield		13	
Provincetown			20	Oregon			29
Randolph			20	Palmyra			29
Roxbury			20	Pickering			29
Royalton			4	Princeton			12
Salisbury			16	Saint Joseph			29
South Dennis			19	Saint Louis			17
Taunton			9	Sedalia			29
Wakefield			19	Shelbina			27
Webster			3	Springfield			29
Wellesley			20	Stellada			17
Westboro			19	Unionville			12
Winchester			20	Vilas			29
Winthrop			15	Warrensburg			30
Woods Holl		11		Wheatland			28
Worcester			4	<i>Nebraska.</i>			
<i>Michigan.</i>				Ansley			11
Adrian			14	Arberville			11
Ann Arbor			14	Beatrice			11
Ball Mountain			14	Beaver City			11
Berrien Springs			14	Bratton			11
Birmingham			21	Callaway			29
Climax			15	Columbus			11
Clinton			20	Cornlea			11
Escanaba			15	Creighton			29
Fairview			15	Crete			11
Flint			30	Culbertson			11
Grand Rapids			14	David City			11
Hanover			21	De Soto			11
Hart			14	Fairbury			11
Hayes			21	Franklin			11
Howell			14	Geneva			11
Jeddo			15	Genoa			11
Maysville			14	Glegwood			11
Ovid			14	Golconda			23
Thornville			21	Haigler			11
Vandalia			15	Harvard			11
Washington			15	Hebron			11
Williamston			15	Holdrege			11
<i>Minnesota.</i>				Imperial			10
Albert Lea			11	Indianola			9
Belle Plaine			2	Kennedy			10
Bonniwells Mills			21	Lexington			10
Cambridge			21	Lincoln			11
Carver			21	Madrid			11
Clearwater			21	Marquette			11
Dawson			11	Minden			11
Farmington			3	Mullen			11
Grand Meadow			11	Nebraska City			11
Hastings			21	Neabit			13
Hutchinson			2	North Platte			10
Mazeppa			11	Ough			19
Medford			11	Red Cloud			11
Minneapolis			2	Seward			11
Minnesota City			21	Springview			1
Morris			21	Stanton			11
New Richland			11	Superior			11
New Ulm			21	Syracuse			20
Redwood Falls			29	Table Rock			11
Rochester			11	Tecumseh			11
Rolling Green			11	Valentine			11
Royalton			21	Wallace			10
Saint Charles			11	Weeping Water			11
Saint Cloud			21	Whitman			29
Saint Paul			2	<i>Nevada.</i>			
Saint Peter			21	Candelaria			23
Sandy Lake Dam			21	Carson City			25
Starbuck			21	Empire Ranch			6
Wabasha			21	Eureka Ranch			13
Waconia			15	Genoa			25
Warren			2	Halleck			23
Winona			21	Hawthorne			9
<i>Mississippi.</i>				Palisade			23
Biloxi		15		Palmetto			17
Briers		15		Reno			24
Edwards		15		Toano			6
Fayette		15		Tybo			24
Hattiesburg		15		Winnemucca			22
Louisville		1		<i>New Hampshire.</i>			
Moss Point		15		Alstead			15
Pearlington		24		Antrim			4
Vicksburg		15		Berlin Mills			13
Waynesboro		16		Brookline			4
Woodville		15		Concord			15
<i>Missouri.</i>				Dublin			4
Bethany			29	East Canterbury			19
Carrollton			12	Grafton			4
Conception			29	Keene			4
Eight Mile			29	Lancaster			15
Fairport			29	Manchester			4
Farmersville			12	Nashua			4
Fox Creek			26	Newton			20
Gallatin			12	North Conway			23
Gorin			12	Plymouth			20
Hannibal			29	Sanbornton			20
Kansas City			3	West Milan			15
Kidder			12	<i>New Jersey.</i>			
Lamonte			29	Bayonne			20
Liberty			12	Beverly			15
McCune			29	Charlotteburg			15

## Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost.			State and station.	First frost.		
	Light.	Heavy.	Snow.		Light.	Heavy.	Snow.
<b>New Jersey—Continued.</b>				<b>Ohio—Continued.</b>			
Chester.....			15	Milligan.....			23
Deckertown.....			4	Napoleon.....			19
Egg Harbor City.....			19	New Berlin.....			24
Elizabeth.....			19	New Comerstown.....			15
Franklin Furnace.....			16	New Holland.....			23
Franklinville.....			15	North Lewisburg.....			24
Freehold.....			15	Northwood.....			20
Junction.....			15	Oberlin.....			30
Lambertville.....			15	Orangeville.....			15
Millville.....			15	Plattsburg.....			15
Moorestown.....			25	Portsmouth.....			18
Newark.....			15	Ridge.....			15
New Brunswick.....			30	Ridgeville Corners.....			21
Paterson.....			15	Rittman.....			23
Perth Amboy.....			15	Sandusky.....			15
Plainfield.....			24	Shenandoah.....			23
Somerville.....			19	Stoutsville.....			15
South Orange.....			19	Vermillion.....			28
Toms River.....			19	Vickery.....			30
<b>New Mexico.</b>				Warren.....			15
Albuquerque.....			11	Wauseon.....			15
Coolidge.....			11	Waverly.....			15
Estalina Springs.....			11	Waynesboro.....			15
Halls Peak.....			11	Westerville.....			23
La Luz.....			12	Wheeler.....			18
Santa Fe.....			10	Zanesville.....			24
Socorro.....			20	<b>Oklahoma.</b>			
Taos.....			25	Oklahoma.....			13
<b>New York.</b>				<b>Oregon.</b>			
Albany.....			16	Astoria.....			1
Honeybrook Brook.....			15	Portland.....			2
Lockport.....			14	Roseburg.....			17
Middletown.....			15	The Dalles.....			23
New Lisbon.....			4	Umatilla.....			23
North Hammond.....			15	<b>Pennsylvania.</b>			
Ogdensburg.....			15	Altoona.....			15
Port Jervis.....			15	Clarion.....			19
Rondout.....			4	Dubois.....			19
South Kortright.....			4	East Mauch Chunk.....			19
Stillwater.....			15	Easton.....			14
Turin.....			15	Freeport.....			30
Varysburg.....			15	Harrisburg.....			15
Watkins.....			23	Johnstown.....			15
Waverly.....			19	Kilmer.....			15
Wedgwood.....			4	Lock Haven.....			19
<b>North Carolina.</b>				Parkers Landing.....			19
Bailey.....			11	Philadelphia.....			20
Bakersville.....			15	Quakertown.....			15
Blowing Rock.....			14	Selins Grove.....			21
Currituck Inlet.....			16	State College.....			15
Falkland.....			24	Warren.....			16
Hatteras.....			17	West Chester.....			15
Henderson.....			3	West Newton.....			16
Highlands.....			5	<b>Rhode Island.</b>			
Kittyhawk.....			17	Block Island.....			1
Littleton.....			23	<b>South Carolina.</b>			
Mocksville.....			17	Aiken.....			16
Mount Airy.....			21	Allendale.....			24
Raleigh.....			24	Blacksburg.....			21
Roxboro.....			24	Charleston.....			25
Southport.....			16	Georgetown.....			25
Tarboro.....			1	McCormick.....			23
Wilmington.....			24	Port Royal.....			16
<b>North Dakota.</b>				Society Hill.....			15
Fargo.....			22	Trial.....			1
<b>Ohio.</b>				<b>South Dakota.</b>			
Akron.....			15	Aberdeen.....			21
Annapolis.....			15	Alexandria.....			2
Ashland.....			15	Brookings.....			11
Athens.....			15	Flandreau.....			2
Auburn.....			23	Howard.....			2
Bement.....			15	Piedmont.....			1
Benton Ridge.....			31	Rosebud.....			1
Big Prairie.....			23	Wentworth.....			24
Bladensburg.....			23	Wolsey.....			2
Bloomington.....			23	<b>Tennessee.</b>			
Bowling Green.....			21	Pikeville.....			14
Cambridge.....			23	Riddleton.....			19
Canal Dover.....			15	<b>Texas.</b>			
Canton.....			23	Abilene.....			14
Cardington.....			16	Amarillo.....			11
Carrollton.....			15	Aurora.....			18
Cincinnati.....			15	Brazoria.....			15
Clarksville.....			23	Brownwood.....			15
Cleveland.....			15	Childress.....			4
Columbus.....			15	Coldwater.....			11
Demos.....			23	College Station.....			15
Dupont.....			10	Columbia.....			15
Ellsworth.....			19	Corsicana.....			15
Garrettsville.....			15	Duval.....			24
Greenville.....			23	El Paso.....			12
Hanging Rock.....			23	Gainesville.....			14
Hillhouse.....			16	Hallettsville.....			15
Hillsboro.....			15	Houston.....			15
Kenton.....			24	Llano.....			15
Kilbourne.....			23	Longview.....			15
Killbuck.....			23	McGregor.....			18
Levering.....			26	Marshall.....			15
Lordstown.....			19	New Braunfels.....			15
Mansfield.....			24	Palestine.....			15
Marietta.....			23	San Antonio.....			15
Marion.....			27	Stella.....			10
				Victoria.....			15

## Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost.			State and station.	First frost.		
	Light.	Heavy.	Snow.		Light.	Heavy.	Snow.
<b>Texas—Continued.</b>				<b>Washington—Cont'd.</b>			
Waco.....			15	Neah Bay.....			23
<b>Utah.</b>				Olympia.....			23
Cisco.....			17	Pine Hill.....			23
Green River.....			25	Pomeroy.....			17
Grouse Creek.....			16	Pullman.....			2
Levan.....			16	Tacoma.....			23
Loa.....			17	Tatoosh Island.....			1
Logan.....			1	Union City.....			23
Loose.....			17	Walla Walla.....			23
Moab.....			17	Waterville.....			2
Ogden.....			21	West Ferndale.....			2
Parowan.....			9	<b>West Virginia.</b>			
Provo City.....			16	Bluefield.....			15
Scotfield.....			25	Buckhannon.....			14
Snowville.....			23	Central.....			14
<b>Vermont.</b>				Charleston.....			15
Cornwall.....			8	Elkhorn.....			14
Simonsville.....			21	Ella.....			15
Vernon.....			21	Glenville.....			14
Wells.....			15	Grafton.....			15
<b>Virginia.</b>				Harpers Ferry.....			9
Alexandria.....			21	Marlinton.....			21
Ashland.....			15	Martinsburg.....			21
Avon.....			31	Nuttallburg.....			14
Bedford City.....			21	Point Pleasant.....			24
Birdsnest.....			24	Spencer.....			23
Cape Charles.....			24	<b>Wisconsin.</b>			
Cape Henry.....			24	Amherst.....			21
Charlottesville.....			21	Baraboo.....			21
Clarksville.....			23	Barron.....			1
Dale Enterprise.....			14	Bayfield.....			14
Falls Church.....			15	Beaver Dam.....			21
Hampton.....			16	Beloit.....			21
Hot Springs.....			15	Black River Falls.....			13
Irwin.....			21	Cadiz.....			21
Lexington.....			21	Centralia.....			21
Lynchburg.....			21	Chippewa Falls.....			15
Marion.....			15	Delavan.....			21
Norfolk.....			1	Eau Claire.....			21
Nottoway.....			24	Fond du Lac.....			13
Petersburg.....			30	Harvey.....			21
Richmond.....			24	Janeville.....			21
Riverton.....			21	Lancaster.....			13
Saluda.....			24	Lincoln.....			14
Spottsville.....			24	Madison.....			21
Stannardsville.....			21	Manitowoc.....			21
Staunton.....			21	Menomonee.....			2
Stephens City.....			19	Millwaukee.....			12
<b>Washington.</b>				Neillsville.....			14
Aberdeen.....			23	New Holstein.....			13
Anacortes.....			23	Oconomowoc.....			15
Bridgeport.....			12	Oconto.....			22
Colfax.....			23	Pepin.....			11
Dayton.....			22	Portage.....			21
East Clallam.....			22	Prairie du Chien.....			12
Elbe.....			2	Raymond.....			14
Ellensburg.....			23	Reedsburg.....			12
Ferry.....			23	Sharon.....			15
Fort Canby.....			1	Shawano.....			15
Fort Simcoe.....			23	Valley Junction.....			14
Fort Townsend.....			21	Waukesha.....			15
Lakeside.....			19	Watertown.....			21
Moxee.....			2	Westfield.....			15

## PERIODS OF HIGH TEMPERATURE.

The most interesting period of high temperature was that which prevailed on the 1st from Colorado and New Mexico northeastward to Michigan, when the maximum temperatures of the month occurred over this region. On the 2d this area had moved eastward and became a much longer and narrower oval from southern Texas to Vermont. On the 3d this warm wave prevailed over the east Gulf states and the entire Atlantic coast. There is every evidence that these warm waves are the combined result of insolation in a clear sky, and of the dynamic warming due to a rather rapid descent; when air is slowly descending in a clear sky the dynamic heating may be counteracted by cooling due to gaseous radiation, and the descending air becomes a cold wave, but when rapidly descending, the descending air becomes a warm wave and the cooling by radiation must complete its process after the air reaches the ground.

## PERIODS OF COLD WEATHER.

The minimum temperatures for the month generally occurred on the 30th in the Northwest, but a movement of low temperature began on the Pacific coast on the 19th, extended



eastward to the eastern slope on the 23d, prevailed over the Mississippi and Ohio valleys and the Gulf States on the 24th, and on the south Atlantic coast on the 25th, the middle Atlantic states on the 26th, and New England on the 27th. During this eastward progress the minimum temperatures occurred as follows: In the Pacific states 23 to 32 on the 17th,

18th, and 19th; on the eastern slope 8 at lower stations and 2 at the summit of Pikes Peak; on the 24th, —10 at northern stations, +10 in the central and +40 at the southern limit; on the 25th, from 20 to 30 in the south Atlantic states; on the 26th, from 15 to 25 in the middle Atlantic states and lower lake region; on the 27th, from 2 to 27 in New England.

### PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for November, 1893, as determined by reports from about 2,000 stations, is exhibited on Chart III. In the meteorological tables the total precipitation is given for each station; the departures from the normal are given for regular stations of the Weather Bureau in the table of climatological data. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

#### NORMAL PRECIPITATION.

The normal precipitation for November is greatest on the coast of Washington and Oregon, and least in the extreme northwest, as shown by the following selected stations: Tatoosh, Wash., 11.9; Fort Canby, Wash., 8.2; Olympia, Wash., 6.5; Roseburg, Oregon, 3.6; Portland, Oregon, 6.0; Assiniboine, Mont., 0.6; Bismarck, N. Dak., 0.7; Fort Buford, N. Dak., 0.5; Cheyenne, Wyo., 0.3; Fort Custer, Mont., 0.4; Dodge City, Kans., 0.5; Las Animas, Colo., 0.2; North Platte, Nebr., 0.4; Saint Vincent, Minn., 0.6; Fort Sully, S. Dak., 0.4; Valentine, Nebr., 0.5; Yuma, Ariz., 0.3.

#### PRECIPITATION FOR NOVEMBER, 1893.

In November, 1893, the monthly precipitation was over 6 in southeastern Virginia and at Cape Hatteras, N. C., also in Louisiana, except near the mouth of the Mississippi. More than 6 fell at most stations in northern California and near the coast of Oregon and Washington. The maximum rainfalls were from 12 to 18 on the coast of Washington and Oregon; the exceptionally heavy rainfalls were 20 at a voluntary station near Roseburg and 34 near Portland. In the interior the precipitation has been mostly in the form of snow which, when melted, gave a maximum of 5.09 at Sault Ste. Marie, Mich., and 5.56 at Parry Sound, Ont. The stations that have reported no measurable precipitation during November have been confined generally to Arizona, New Mexico, eastern Colorado, western Kansas, and Nebraska.

#### DEPARTURES FROM NORMAL PRECIPITATION.

The precipitation was in excess of the normal at a few stations in the east Atlantic states and at most stations on the North Carolina and Virginia coasts, where the excess averaged about 3; a slight excess was also reported at Detroit and Port Huron, Mich., Davenport and Keokuk, Iowa. The principal area of excess includes Montana, Washington, Oregon, and northern California; the maximum excess was 7.3 at Eureka, Cal., 6.4 at Fort Canby, Wash., and 6.6 at Olympia, Wash.

Considered by districts, the monthly precipitation for November, 1893, when compared with the normal for the month, furnishes the following percentages; the precipitation is in excess when the percentages of the normal exceed 100: Middle Pacific coast, 204; northern plateau, 182; north Pacific coast, 159; northern slope, 121; middle Atlantic states, 112; west Gulf states, 98; middle plateau, 90; upper Lake region, 88; extreme northwest, 86; south Atlantic and east Gulf states, 81; lower lake region and upper Mississippi valley,

78; middle slope, 73; Ohio Valley and Tennessee, 66; Missouri Valley, 61; New England, 53; southern plateau, 41; south Pacific coast, 38; southern slope, 37; Key West, 19.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for November for a series of years; (2) the length of record during which the observations have been taken and from which the average has been computed; (3) the total precipitation for November, 1893; (4) the departure of the current month from the average; (5) the extremes for November during the period of observation and the years of occurrence:

State and station.	(1) Average for the month of Nov.	(2) Length of record.	(3) Total for Nov., 1893.	(4) Departure from average.	(5) Extremes for November.			
					Greatest.		Least.	
					Am't.	Year.	Am't.	Year.
<i>Arizona.</i>	<i>Inches.</i>	<i>Years.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>		<i>Inches.</i>	
Fort Apache .....	1.18	17	0.28	— 0.90	2.83	1890	0.00	1891
Fort Mohave .....	0.61	21	0.28	— 0.33	6.16	1888	0.00	
Whipple Barracks .....	0.78	31	1.16	+ 0.38	3.18	1888	0.00	
<i>Arkansas.</i>								
Keesees Ferry .....	4.34	13	2.51	— 1.83	8.85	1891	2.10	1893
<i>California.</i>								
Riverside .....	0.68	13	0.48	— 0.20	2.47	1888	0.00	1883, '91
<i>Colorado.</i>								
Las Animas .....	0.22	12	T.	— 0.22	0.70	1885	0.00	1890, '91
<i>Florida.</i>								
Merritts Island .....	2.26	15	1.99	— 0.27	5.67	1884	0.17	1886
<i>Georgia.</i>								
Forsyth .....	3.44	19	1.54	— 1.90	5.41	1888	0.50	1890
<i>Idaho.</i>								
Boise Barracks .....	1.09	20	3.14	+ 2.05	4.43	1874	0.00	1890
Fort Sherman .....	2.77	10	7.00	+ 4.23	7.00	1892-'93	0.29	1882
<i>Indiana.</i>								
Lafayette .....	3.24	11	2.65	— 0.59	6.31	1891	1.44	1884
<i>Iowa.</i>								
Cresco .....	1.46	22	0.84	— 0.62	5.20	1879	0.18	1875
<i>Kansas.</i>								
Independence .....	1.89	21	1.44	— 0.45	3.90	1876	0.06	1872
<i>Louisiana.</i>								
Grand Coteau .....	3.39	10	6.42	+ 3.03	6.42	1893	1.51	1890
<i>Maine.</i>								
Orono .....	4.57	23	1.43	— 3.14	8.76	1886	1.43	1893
<i>Maryland.</i>								
Cumberland .....	2.34	22	2.01	— 0.33	5.34	1889	0.82	1887
<i>Michigan.</i>								
Kalamazoo .....	2.61	17	2.09	— 0.52	5.77	1877	1.25	1882
<i>Missouri.</i>								
Sedalia .....	2.02	15	2.16	+ 0.14	3.17	1881	0.53	1885
<i>Montana.</i>								
Fort Custer .....	0.52	14	1.68	+ 1.16	1.68	1891-'93	0.05	1887
<i>Nebraska.</i>								
Fort Robinson .....	0.52	10	0.23	— 0.29	1.70	1885	0.07	1892
Genoa (near) .....	0.70	17	0.72	+ 0.02	1.43	1886	T.	1883
<i>Nevada.</i>								
Browns .....	0.20	21	.....	.....	1.39	1885	0.00	
Carson City .....	1.63	16	1.49	— 0.14	7.01	1875	0.00	1884
<i>New Hampshire.</i>								
Hanover .....	3.66	22	0.94	— 2.72	6.62	1885	0.59	1882
<i>New Mexico.</i>								
Deming .....	0.81	11	0.06	— 0.75	1.80	1892	0.00	1886, '91
<i>New York.</i>								
Fort Wingate .....	0.67	20	.....	.....	2.12	1878	0.00	
<i>Cooperstown.</i>								
Cooperstown .....	3.08	22	2.20	— 0.88	4.72	1886	1.45	1876
<i>Plattsburg Barracks.</i>								
Plattsburg Barracks .....	2.38	22	1.28	— 1.10	4.39	1885	0.54	1882
<i>North Carolina.</i>								
Lenoir .....	3.39	21	2.20	— 1.19	7.60	1877	0.00	1890
<i>Oklahoma.</i>								
Fort Reno .....	0.97	10	0.93	— 0.04	3.38	1884	0.00	1886, '92
Fort Sill .....	1.44	21	1.30	— 0.14	4.06	1890	0.19	1873
Fort Supply .....	1.01	13	0.70	— 0.31	3.30	1874	0.10	1886
<i>Oregon.</i>								
Bandon .....	6.15	15	14.04	+ 7.88	18.21	1885	0.33	1890
<i>Pennsylvania.</i>								
Dyberry .....	3.21	22	2.17	— 1.04	7.00	1886	1.40	1882
Grampian .....	3.03	17	1.72	— 1.31	6.03	1886	1.42	1873
Wellaboro .....	4.28	14	3.00	— 1.28	9.07	1889	0.93	1890
<i>South Carolina.</i>								
Statesburg .....	1.85	12	2.19	+ 0.34	3.90	1882	0.87	1886
<i>South Dakota.</i>								
Fort Sully .....	0.42	22	0.55	+ 0.13	1.60	1886	0.00	1883

## Departures from average precipitation—Continued.

State and station.	(1) Average for the month of Nov.	(2) Length of record.	(3) Total for Nov., 1893.	(4) Departure from average.	(5) Extremes for November.			
					Greatest.		Least.	
					Am't.	Year.	Am't.	Year.
<i>Texas.</i>	<i>Inches.</i>	<i>Years.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>		<i>Inches.</i>	
Austin.....	2.98	21	4.90	+ 1.92	7.53	1874	0.25	1879
Silver Falls.....	1.14	7	0.10	- 1.04	4.68	1888	0.03	1886
<i>Utah.</i>								
Terrace.....	0.36	19	0.70	+ 0.34	1.83	1874	0.00	*
<i>Vermont.</i>								
Strafford.....	3.45	20	1.75	- 1.68	6.20	1888	0.50	1874
<i>Virginia.</i>								
Dale Enterprise.....	2.63	13	2.40	- 0.23	6.46	1886	0.52	1882
<i>Washington.</i>								
Fort Townsend.....	2.83	18	3.31	+ 0.48	9.21	1874	0.39	1884
<i>West Virginia.</i>								
Parkersburg.....	3.01	8	2.07	- 0.94	4.96	1889	1.12	1892
<i>Wisconsin.</i>								
Madison.....	2.04	21	1.30	- 0.74	6.02	1879	0.40	1875
<i>Wyoming.</i>								
Fort Washakie.....	0.56	9	1.40	+ 0.84	1.40	1893	0.06	1890

\*Frequently.

## PRECIPITATION, JANUARY TO NOVEMBER.

For the period January to November, 1893, inclusive, the total precipitation was in excess over the Rocky Mountain plateau regions and the north and middle Pacific coasts by about 15 per cent of its normal value. Over the rest of the United States the total precipitation was deficient, and especially over the middle and southern Rocky Mountain slopes.

The precipitation for the current year, as compared with the normal for this period, furnishes the following percentages; the precipitation is in excess when the percentages of the normal exceed 100:

Northern plateau, 134; north Pacific coast, 125; southern plateau, 107; middle plateau, 105; middle Pacific coast, 105; middle Atlantic states, 98; Ohio Valley and Tennessee, 95; lower lake region, 92; south Atlantic states, 92; extreme northwest, 91; upper Mississippi valley, 89; New England, 88; upper lake region, 88; Missouri Valley, 86; east Gulf states, 84; northern slope, 78; southern Pacific coast, 77; Key West, 73; west Gulf states, 72; southern slope, 68; middle slope, 63.

## YEARS OF GREATEST PRECIPITATION FOR NOVEMBER.

The precipitation for the current month is the largest on record at regular stations of the Weather Bureau as follows: at Norfolk, Va., 6.75, or 8.6 above the normal—the largest preceding being 6.4 in 1881; Astoria, Oregon, 17.41, or 9.7 above the normal—the largest preceding being 16.78 in 1892.

The greatest recorded precipitation for November occurred over the greater part of Louisiana and Arkansas in 1889; along the middle and south Pacific coasts in 1885; in the interior of the east Gulf and south Atlantic states in 1880; from the lower Missouri valley over the western lake region in 1879; and in Maryland, the District of Columbia, and Virginia in 1877.

## YEARS OF LEAST PRECIPITATION FOR NOVEMBER.

The precipitation for the current month is the least ever reported for November at regular stations of the Weather Bureau, as follows: Albany, N. Y., 0.91, or 2.2 below the normal—the smallest preceding precipitation for November was 0.97 in 1882; Erie, Pa., 1.97, or 2.5 below the normal—the smallest precipitation during preceding Novembers was 2.51 in 1874.

In general the least precipitation for November was noted in the south Atlantic and east Gulf states, and from the Pacific coast eastward over the middle and northern plateau regions in 1890; in the extreme upper Mississippi valley in 1888; over the greater part of New England in 1882; over

Illinois, eastern Iowa, and eastern Missouri in 1875; and in the Ohio Valley in 1872.

## EXCESSIVE PRECIPITATION.

The following tables for November, 1893, show, by states, the number of stations reporting total precipitation to equal or exceed 10.00 inches during the month; 2.50 in 24 hours, and 1.00 in 1 hour:

## Monthly precipitation to equal or exceed 10.00.

State.	Number of stations.	State.	Number of stations.
Oregon.....	15	California.....	10
Washington.....	11		

## Precipitation to equal or exceed 2.50 in 24 hours.

State.	Number of stations.	Dates.	State.	Number of stations.	Dates.
Louisiana.....	24	18, 18-19, 19, 25-26, 26, 26-27, 27-28.	Arkansas.....	3	20, 25-26, 26-27.
Oregon.....	12	2-3, 4, 4-5, 6-7, 7-8, 23, 23-24, 26, 27-28, 28-29, 29, 30.	Mississippi.....	3	25, 26-27, 27.
California.....	9	25-26, 26, 26-27, 26-28, 27.	Florida.....	3	4, 21-22.
Virginia.....	8	7-8, 7-9, 8, 8-9	Maryland.....	2	8-9, 9.
North Carolina....	4	6-7, 7-8, 8.	Washington.....	2	4-5, 23-24.
Texas.....	4	13-14, 19-20, 25-26, 26.	Alabama.....	1	27.
			Missouri.....	1	27.
			South Carolina....	1	6.
			Tennessee.....	1	26-27.

## Precipitation to equal or exceed 1.00 in 1 hour.

Texas.....	4	20, 26.	Louisiana.....	2	18, 26.
Florida.....	3	4, 27.	South Carolina..	1	6.

## Table of excessive precipitation, November, 1893.

State and station.	Monthly rainfall in inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall 1 inch, or more, in one hour.		
		Am't.	Day.	Am't.	Time.	Day.
<i>Alabama.</i>	<i>Inches.</i>	<i>Inches.</i>		<i>Inches.</i>	<i>H. m.</i>	
Brewton.....	3.00	3.00	27			
<i>Arkansas.</i>						
Camden a.....	2.68	2.68	25-26			
Camden b.....	2.65	2.65	25-26			
Searcy.....	2.73	2.73	20			
Do.....	3.12	3.12	26-27			
<i>California.</i>						
Arcata.....	11.90	4.39	27			
Cloverdale.....	2.62	2.62	26			
Crescent City.....	13.10					
Crescent City Lighthouse.....	13.05					
Dunsmuir.....	11.35					
Eureka.....	3.70	3.70	26-27			
Fort Ross.....	15.07					
Georgetown.....	10.94					
Grass Valley a.....	3.50	3.50	26			
Gridley.....	2.63	2.63	25-26			
Mills College.....	2.88	2.88	25-26			
Shasta Springs.....	10.63	3.05	26-27			
Towles.....	10.63					
Trinidad Lighthouse.....	10.06					
Ukiah.....	3.63	3.63	25-26			
Upper Mattole.....	14.93	5.93	26-28			
<i>Florida.</i>						
Gainesville.....	3.65	3.65	21-22			
Jupiter.....	3.50	3.50	4	3.50	0 51	4
Titusville.....				1.00	0 45	27
<i>Louisiana.</i>						
Abbeville.....	3.00	3.00	26			
Amite.....	3.17	3.17	27-28			
Baton Rouge.....	3.33	3.33	26-27			
Clinton.....	3.32	3.32	26			
Coushatta b.....	2.60	2.60	26			
Covington.....	2.60	2.60	18	1.34	0 40	18
Do.....	2.90	2.90	26-27			
Donaldsonville.....	4.06	4.06	18-19			
Franklin.....	5.09	5.09	18-19			
Girard.....	2.72	2.72	26			
Hamburg.....	2.62	2.62	26			
Hammond.....	3.10	3.10	25-26			
Houma.....	3.37	3.37	19			
Lake Charles.....	2.50	2.50	18			
Lawrence.....	2.50	2.50	26			
Melville.....	3.00	3.00	26			
Minden.....	2.69	2.69	26			



Table of excessive precipitation—Continued.

State and station.	Monthly rainfall in inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Louisiana—Continued.						
New Orleans	Inches.	Inches.		Inches	h. m.	
Oxford	3.35	25-27		2.00	2 00	26
Plaquemine	2.78	26				
Port Eads	2.90	26				
Roseland	2.73	26-27				
Sugar Experimental Station	3.50	26-27				
Wallace	3.69	26				
West End	2.86	18				
	3.16	26				
Maryland.						
Solomons	2.96	8-9				
Valley Lee	3.37	9				
Mississippi.						
Biloxi	3.85	25				
Hattiesburg	4.00	26-27				
Logtown	2.73	27				
Missouri.						
Glasgow	2.60	27				
North Carolina.						
Falkland	3.16	6-7				
Hatteras	6.16	7-8				
Weldon	2.51	7-8				
Willeton	3.32	8				
Oregon.						
Albany a	10.58	3.58	28-29			
Astoria	17.41	2.65	3-3			
Aurora (near)		2.81	28-29			
Bandon	14.04	2.51	4-5			
Do		2.85	27-28			
Corvallis (near)	10.14					
Gardiner	16.53	3.51	18-29			
Glenora	34.88	3.77	4			
Do		10.40	7-8			
Do		6.56	23-24			
Do		2.56	26			
Do		3.06	29			
Hubbard		2.83	29			
Jacksonville		2.52	30			
Lafayette	12.41					
Langlois	20.42	2.56	23			
Do		7.30	28-29			
McMinnville a	11.57					
McMinnville b	10.94					
Newport	14.68					
Oregon City	11.08	2.97	29			
Salem b		3.00	29			
Springbrook	10.16					
Toledo	18.89					
Vernonia	15.14	3.03	6-7			
South Carolina.						
Simpsonville		2.57	6	2.57	1 05	6
Tennessee.						
Dyersburg		2.56	26-27			
Texas.						
Brenham	10.47	2.82	13-14			
Do		6.45	25-26			
Columbia				2.25	1 45	26
Galveston				1.52	1 00	26
Houston		3.17	25-26			
Stella		2.63	26	2.63	2 10	26
Sulphur Springs		3.89	19-20			
Tyler				1.10	1 00	20
Virginia.						
Birdsneast		5.75	7-9			
Cape Charles		5.92	7-8			
Cape Henry		6.08	7-9			
Falls Church		2.64	8			
Hampton		5.53	7-9			
Norfolk		5.48	8-9			
Saluda		5.26	8-9			
Spottsville		5.24	7-9			
Washington.						
Aberdeen	14.37					
East Clallam	14.85					
Elbe	15.18					
Ferry	13.65					
Fort Canby	12.91					
Neah Bay	14.83	3.46	23-24			
Olympia	12.86					
Pysht	13.36	2.73	4-5			
Silver Creek	11.84					
Tatoosh Island	11.63					
Union City	13.05					

## MAXIMUM RAINFALL IN ONE HOUR OR LESS.

The following table is a record of the heaviest rainfall during November, 1893, for periods of five and ten minutes and one hour, as reported by regular stations of the Weather Bureau furnished with self-registering rain gauges. This record refers strictly to rainfall; the frequent interruptions of the self-register, due to snow, explain the numerous cases of incomplete record.

Maximum rainfall in one hour or less.

Station.	Maximum rainfall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.
Atlanta, Ga.	Inch.		Inch.		Inch.	
Baltimore, Md.	0.05	21	0.09	21	0.33	21
Bismarck, N. Dak.	0.03	8	0.05	8	0.23	8
Boston, Mass.	0.03	28	0.04	28	0.11	28
Buffalo, N. Y.	0.05	22	0.06	22	0.20	22
Cincinnati, Ohio	0.05	21	0.08	21	0.30	21
Chicago, Ill.	0.03	27	0.03	27	0.08	27
Cleveland, Ohio						
Denver, Colo.						
Detroit, Mich.	0.04	29	0.07	29	0.29	29
Dodge City, Kans.	0.02	20	0.04	20	0.11	20
Duluth, Minn.						
Eastport, Me.	0.01	15	0.02	15	0.09	15
Galveston, Tex.	0.38	18	0.45	18, 26	1.52	26
Indianapolis, Ind.	0.10	21	0.14	21	0.43	21
Jacksonville, Fla.	0.11	27	0.18	27	0.48	27
Jupiter, Fla.	0.34	4	0.68	4	3.50	4
Kansas City, Mo.	0.02	31	0.03	31	0.15	31
Key West, Fla.	0.04	14	0.07	14	0.13	14
Marquette, Mich.						
Memphis, Tenn.	0.06	4	0.10	21	0.27	26
Milwaukee, Wis.						
Nantucket, Mass.	0.06	13	0.09	13	0.25	13
Nashville, Tenn.	0.03	21	0.06	4	0.30	21
New Orleans, La.	0.35	21	0.64	21	11.00	26
New York, N. Y.	0.04	28	0.07	28	0.30	28
Norfolk, Va.	0.10	8	0.15	8	0.64	8
Olympia, Wash.	0.05	7	0.10	7	0.44	7
Omaha, Nebr.						
Philadelphia, Pa.	0.06	27	0.07	4, 27	0.17	4
Pittsburg, Pa.						
Portland, Me.	0.05	28	0.07	28	0.21	22
Portland, Oregon	0.05	5	0.07	5	0.20	28
Rochester, N. Y.	0.02	3	0.03	3	0.11	3
Saint Louis, Mo.						
Saint Paul, Minn.						
Salt Lake City, Utah	0.01	27	0.03	27	0.10	27
San Diego, Cal.	0.07	17	0.12	17	0.27	17
San Francisco, Cal.	0.09	24	0.07	24	0.25	24
Savannah, Ga.	0.28	27	0.47	27	0.58	23
Tampa, Fla.	0.25	27	0.40	27	0.90	27
Vicksburg, Miss.	0.12	4	0.17	4	0.29	4
Washington, D. C.	0.03	8	0.05	8	0.28	8
Wilmington, N. C.	0.03	27	0.05	27	0.23	21

\* Record incomplete.

† Self-register out of order.

‡ Estimated.

§ Less than 0.05 in 1 hour.

The following tables show the number of years for which monthly precipitation to equal or exceed 10.00 inches, daily precipitation to equal or exceed 2.50 inches, and hourly precipitation to equal or exceed 1.00 inch has been reported in the several states and territories for November during the last 24 years:

Excessive monthly precipitation.

State.	No. years noted.	State.	No. years noted.
Washington	14	Wisconsin	1
Oregon	11	Illinois	1
California	7	Kentucky	1
Maryland	4	Arizona	0
Texas	4	District of Columbia	0
Mississippi	4	Idaho	0
North Carolina	4	Indian Territory	0
Louisiana	3	Iowa	0
Arkansas	3	Maine	0
Massachusetts	3	Minnesota	0
New York	3	Missouri	0
Florida	2	Montana	0
Indiana	2	Nebraska	0
New Hampshire	2	Nevada	0
New Jersey	2	New Mexico	0
Tennessee	2	Ohio	0
Alabama	1	Rhode Island	0
Colorado	1	The Dakotas	0
Connecticut	1	South Carolina	0
Delaware	1	Utah	0
Georgia	1	Vermont	0
Kansas	1	Virginia	0
Michigan	1	West Virginia	0
Pennsylvania	1	Wyoming	0

Excessive daily precipitation (24 hours).

Louisiana	19	Florida	11
Texas	19	New York	10
North Carolina	18	Illinois	10
Alabama	14	Indiana	9
Tennessee	14	Arkansas	9
Massachusetts	13	Missouri	9
Georgia	12	Oregon	9
Mississippi	12	Connecticut	8

## Excessive daily precipitation (24 hours)—Continued.

State.	No. years noted.	State.	No. years noted.
South Carolina	8	West Virginia	3
Washington	8	Colorado	3
Maine	7	Delaware	2
New Jersey	7	Indian Territory	2
Pennsylvania	7	Vermont	2
California	7	Arizona	2
Iowa	6	The Dakotas	1
Kansas	6	District of Columbia	1
New Hampshire	6	Minnesota	1
Michigan	6	Nebraska	1
Ohio	6	New Mexico	1
Kentucky	5	Idaho	0
Rhode Island	4	Montana	0
Maryland	4	Nevada	0
Virginia	4	Utah	0
Wisconsin	3	Wyoming	0

## Excessive hourly precipitation.

Texas	9	Delaware	0
Mississippi	4	Idaho	0
Florida	4	Illinois	0
North Carolina	3	Indian Territory	0
Tennessee	3	Iowa	0
California	2	Maine	0
Indiana	2	Massachusetts	0
Alabama	2	Minnesota	0
Georgia	2	Missouri	0
South Carolina	2	Montana	0
District of Columbia	1	Nevada	0
Kansas	1	New Hampshire	0
Kentucky	1	New Jersey	0
Michigan	1	New Mexico	0
Nebraska	1	Ohio	0
New York	1	Oregon	0
Pennsylvania	1	Rhode Island	0
Virginia	1	The Dakotas	0
West Virginia	1	Utah	0
Louisiana	1	Vermont	0
Arizona	0	Washington	0
Arkansas	0	Wisconsin	0
Colorado	0	Wyoming	0
Connecticut	0	Maryland	0

The following tables give exceptionally heavy monthly, daily, and hourly precipitation reported for November during the last 24 years:

## Monthly.

Station and state.	Am't.	Year.	Station and state.	Am't.	Year.
Glenora, Oregon	34.88	1893	Neah Bay, Wash.	23.06	1891
Crescent City, Cal.	31.93	1885	Fort Stevens, Oregon	22.21	1877
Delta, Cal.	29.35	1885	Point Pleasant, La.	20.89	1877
Glenora, Oregon	25.56	1892	Neah Bay, Wash.	20.62	1892
Fort Gaston, Cal.	24.54	1885	Aberdeen, Wash.	20.46	1892
Georgetown, Cal.	24.13	1875	Langlois, Oregon	20.42	1893
Edmonton, Cal.	23.09	1892			

## Daily (24 hours).

Station and state.	Amount.	Date.	Station and state.	Amount.	Date.
Edmonton, Cal.	14.30	28-30, 1892	Oleta, Cal.	5.95	29-30, 1892
Middletown, Cal.	14.10	26-30, 1892	Red Bluff, Cal.	5.93	8-9, 1885
Los Gatos, Cal.	13.16	27-30, 1892	Upper Mattole, Cal.	5.93	26-28, 1893
Cloverdale, Cal.	11.86	27-30, 1892	Cape Charles, Va.	5.92	7-8, 1893
Georgetown, Cal.	11.08	28-30, 1892	Charleston, S. C.	5.84	16-17, 1880
Glenora, Oregon	10.40	7-8, 1893	Thatchers Island, Mass.	5.75	18-19, 1878
Fort Barrancas, Fla.	10.39	25, 1878	Birdsneest, Va.	5.75	7-9, 1893
San Luis Obispo, Cal.	10.04	17-18, 1885	Cheneyville, La.	5.70	9, 1891
Placerville, Cal.	9.92	26-30, 1892	Galveston, Tex.	5.63	6, 1873
Susanville, Cal.	8.91	26-30, 1892	Payette, Miss.	5.60	27-28, 1880
Bluff Settlement, Tex.	8.00	14-16, 1874	Hampton, Va.	5.53	7-9, 1893
Cheneyville, La.	7.91	15-16, 1890	Wellsboro, Pa.	5.50	23, 1884
Dover, Del.	7.58	18-20, 1876	Norfolk, Va.	5.48	8-9, 1893
Langlois, Oregon	7.30	28-29, 1893	Boston, Mass.	5.43	30-31, 1876
Point Pleasant, La.	7.10	26, 1877	East Clallam, Wash.	5.41	17-19, 1892
Marion, Ala.	7.00	6-7, 1885	Barnegat City, N. J.	5.33	24-25, 1877
Melissa, Tex.	7.00	1, 1877	Saluda, Va.	5.26	8-9, 1893
Belmont Farm, Tex.	7.00	1, 1877	Linnville, N. C.	5.25	9-10, 1891
Point Pleasant, La.	6.80	8, 1877	Ft. Independence, Mass.	5.25	21-22, 1874
Quitman, Ga.	6.70	5-6, 1880	Newport, Mich.	5.25	24-25, 1884
Glenora, Oregon	6.56	23-24, 1893	Spottsville, Va.	5.24	7-9, 1893
Brenham, Tex.	6.45	25-26, 1893	Shasta Springs, Cal.	5.21	27-28, 1892
Milton, Mass.	6.40	25-27, 1888	Charleston, Ill.	5.21	26-27, 1893
Hatteras, N. C.	6.16	7-8, 1893	Nevada City, Cal.	5.20	30, 1892
Booneville, Miss.	6.12	31-22, 1891	Okaloosa, La.	5.20	9, 1879
Cape Henry, Va.	6.08	7-9, 1893	Palermo, Cal.	5.16	30-30, 1892
Fort Barrancas, Fla.	6.07	16, 1881	Mattoon, Ill.	5.11	26, 1887
Point Pleasant, La.	6.03	11-12, 1881	Camden, Ala.	5.14	31-1, 1892
Greensboro, Ala.	6.00	6-7, 1885	Camden, Ala.	5.10	31-1, 1892

## Excessive daily precipitation—Continued.

Station and state.	Amount.	Date.	Station and state.	Amount.	Date.
Dyersburg, Tenn.	Inches.	16, 1891	Sandy Springs, Md.	Inches.	23-24, 1877
Franklin, La.	5.10	18-19, 1893	Vandalia, Ill.	5.00	26, 1887
Palestine, Tex.	5.09	10, 1883	Ellsworth, N. C.	5.00	26, 1880
White Plains, N. Y.	5.05	27-28, 1890	Reidsville, N. C.	5.00	7-8, 1885
Lake Charles, La.	5.04	16, 1890			

\* October 31-November 1.

## One hour and less.

Station and state.	Amount.	Time.	Date.
New York, N. Y.	Inches.	A. M.	
Galveston, Tex.	0.25	0 02	18, 1886
New Orleans, La.	0.38	0 05	18, 1893
Jupiter, Fla.	0.35	0 05	21, 1893
Savannah, Ga.	0.34	0 05	4, 1893
Galveston, Tex.	0.28	0 05	27, 1893
Tampa, Fla.	0.25	0 05	6, 1892
Memphis, Tenn.	0.25	0 05	27, 1893
Washington, D. C.	0.40	0 05	16, 1890
Jupiter, Fla.	0.35	0 05	23, 1891
Do.	0.30	0 05	29, 1890
New Orleans, La.	0.68	0 10	4, 1893
Galveston, Tex.	0.64	0 10	21, 1893
Vicksburg, Miss.	1.48	0 15	5, 1877
Loctown, Miss.	1.82	0 30	15, 1879
Hallettsville, Tex.	2.10	0 30	1, 1892
Jupiter, Fla.	1.60	0 30	8, 1891
	3.50	0 51	4, 1893

\* Record incomplete.

## MONTHLY SNOWFALL.

The depth of snow that fell during the month of November, as reported by both regular and voluntary observers, is shown by the lines and figures on Chart VI, which also gives, by the full line, the limit at which minimum temperatures of 32° F. were at any time reported at the regular Weather Bureau stations; by the dotted line is given a similar limit for 40°. These air temperatures within Weather Bureau shelters are, of course, higher than would be given by thermometers exposed in the open air. The line of 40° within a shelter usually marks the limit of frosts on the open surface of the ground. The date of the first snow is given in the table of dates of first frost on p. 316.

Monthly snowfalls of five inches or more occurred as given in the following table, and in states where the maximum was below that amount the station reporting the greatest is given:

## Snowfall of five inches or more, November, 1893.

State and stations.	Inches.	State and stations.	Inches.
Alabama.		Colorado—Continued.	
Newberg	Trace.	Pagoda (near)	14.0
Arizona.		Pikes Peak	48.27
Flagstaff	17.0	Red Cliff	24.6
California.		River Bend	7.0
Cisco	21.0	Seaboard	12.0
Edmonton	15.0	Seibert	6.0
Emigrant Gap	12.0	Smoky Hill Mine	27.0
Julian	10.0	Stamford	11.5
Summit	26.0	Steamboat Spring	7.5
Truckee	5.0	Surface Creek	8.0
Colorado.		T. S. Ranch	5.5
Arboles	5.0	Twin Lakes	30.0
Boulder	9.0	Ward District	43.2
Breckenridge	42.8	Connecticut.	
Castle Rock	10.0	Falls Village	3.0
Climax	64.5	Delaware.	
Colbran	6.5	Millshoro	Trace.
Come (near)	12.7	Senford	Trace.
Cope	7.5	District of Columbia.	
Denver	6.6	Washington	Trace.
Divide Experimental Station	5.7	Idaho.	
Dumont	15.0	Grangeville	6.0
Fort Collins	6.5	Idaho Falls	5.0
Glenwood Springs	8.5	Kootenai	61.5
Gold Hill	25.7	Lake	24.5
Grand Junction	6.0	Martin	10.0
Gunnison	5.0	Paris	8.0
Lay	14.0	Payette	5.0
Leslie	5.0	Illinois.	
McCoy	12.5	Atwood	7.7
Moraine	13.2	Bridwood	6.0



Snowfall of five inches or more—Continued.

Snowfall of five inches or more—Continued.

State and stations.	Inches.	State and stations.	Inches.	State and stations.	Inches.	State and stations.	Inches.
<i>Illinois—Continued.</i>		<i>Minnesota—Continued.</i>		<i>Ohio.</i>		<i>Washington—Continued.</i>	
Chicago.....	7.5	Fort Ripley.....	6.0	Bement.....	11.0	East Sound.....	5.5
Dixon.....	7.0	Grand Meadow.....	9.0	Cleveland (W. B.).....	6.3	Elbe.....	17.5
Galva.....	8.8	Hastings.....	10.0	Cleveland (V. O.).....	8.1	Fort Simcoe.....	24.0
Lagrange.....	9.0	Lake Winnibigoshish.....	12.4	Colebrook.....	13.5	Fort Spokane.....	19.1
Oregon.....	12.5	Leech Lake.....	11.0	Harbor.....	8.0	Lake-side.....	20.5
Owego.....	8.0	Long Prairie.....	12.5	Hillhouse.....	11.0	Madrone.....	7.0
Ottawa.....	6.0	Maple Plain.....	10.5	Wheeler.....	15.0	Moxee Valley.....	15.4
Riley.....	11.8	Marfield.....	9.0	<i>Oklahoma.</i>		Olga.....	5.5
Rockford.....	12.5	Mazeppa.....	8.0	<i>Oregon.</i>		Pine Hill.....	12.0
Sycamore.....	12.0	Medford.....	6.5	Fort Supply.....	1.0	Pomeroy.....	9.8
Walcutt.....	7.0	Minneapolis (W. B.).....	8.2	Arlington.....	5.5	Port Crescent.....	8.7
Winnebago.....	10.0	Minneapolis a.....	10.8	Baker City.....	14.1	Rosalie.....	14.5
<i>Indiana.</i>		Minneapolis b.....	8.7	Crook.....	7.5	Spokane.....	16.0
Angola.....	3.5	Minneapolis c.....	7.3	Hood River (near).....	15.0	Union City.....	7.0
<i>Iowa.</i>		Minnesota City.....	7.5	Joseph.....	13.5	Waterville.....	22.0
Alta a.....	6.2	New London.....	7.0	Sparta.....	11.0	West Ferndale.....	13.9
Audubon.....	8.0	Park Rapids.....	5.0	The Dalles.....	12.0	<i>West Virginia.</i>	
Belle Plaine.....	7.5	Pine River.....	7.0	<i>Pennsylvania.</i>		Pleasant Hill.....	3.0
Carroll.....	5.0	Pokegama Falls.....	8.1	Blue Knob.....	11.5	<i>Wisconsin.</i>	
Cedar Falls.....	5.5	Red Wing.....	5.5	Drift.....	8.3	Amherst.....	16.5
Cedar Rapids.....	5.8	Royalton.....	12.0	Dyberry.....	7.5	Baraboo.....	11.0
Charles City.....	7.0	Saint Charles.....	7.0	Erie.....	5.7	Bayfield.....	14.0
Clinton.....	7.0	Saint Cloud.....	10.0	Girardville.....	6.8	Beaver Dam.....	13.5
Cresco.....	6.0	Saint Paul.....	6.5	Saegerstown.....	8.0	Belleville.....	14.0
Davenport.....	5.5	Sandy Lake Dam.....	7.2	Salem Corners.....	6.0	Beloit.....	10.4
Delaware.....	5.5	Sauk Center.....	7.0	Shinglehouse.....	6.6	Black River Falls.....	16.0
Des Moines.....	8.1	Wabasha.....	8.5	Smethport.....	15.0	Butternut.....	6.5
Dubuque.....	9.3	Waconia.....	8.5	Warren.....	6.0	Cadiz.....	7.3
Elkader.....	6.0	Winona.....	10.8	<i>South Carolina.</i>		Chippewa Falls.....	13.0
Fulton.....	10.0	<i>Mississippi.</i>		Blacksburg.....	Trace.	City Point.....	12.5
Galva.....	7.9	Pontotoc.....	Trace.	<i>South Dakota.</i>		Columbus.....	18.0
Grand Meadow.....	8.2	<i>Missouri.</i>		Aberdeen.....	5.0	Delavan (near).....	11.5
Hampton.....	7.8	Unionville.....	2.5	Ashcroft.....	5.5	Eau Claire.....	11.0
Hopkinton.....	7.3	<i>Montana.</i>		Bear Valley.....	6.8	Estella.....	10.5
Independence.....	6.5	Boulder.....	5.2	Cross.....	5.0	Florence.....	12.5
Iowa City a.....	7.0	Choteau.....	21.0	Fort Meade.....	8.5	Fond du Lac.....	14.0
Larrabee.....	8.0	Cokedale.....	30.0	Gary.....	5.0	Grantsburg.....	9.0
Logan.....	6.0	Deer Lodge City.....	7.5	Huron.....	7.1	Green Bay.....	11.4
Maquoketa.....	5.0	Elk Park.....	36.0	Oelrichs.....	9.5	Harvey.....	9.4
Mechanicsville.....	14.0	Fort Custer.....	12.8	Rosebud.....	12.0	Hayward.....	10.5
Monticello.....	10.5	Fort Logan.....	20.0	Spearfish.....	9.5	Hillsboro.....	11.0
Newton.....	6.5	Fort Missoula.....	7.8	Tyndall.....	6.0	Janesville.....	8.5
Osgo.....	5.5	Glendive.....	12.5	Wessington Springs.....	5.0	Koepenick.....	16.0
Storm Lake.....	6.7	Great Falls.....	16.4	<i>Tennessee.</i>		La Crosse.....	7.9
Tipton.....	10.0	Havre.....	6.0	Jacksboro.....	0.5	Lancaster.....	8.0
Williams.....	5.4	Helena.....	12.5	Coldwater.....	0.8	Lincoln.....	10.1
<i>Kansas.</i>		Hogan.....	16.0	<i>Texas.</i>		Madison.....	6.5
Downs.....	4.0	Martinsdale.....	23.5	Castle Gate.....	8.0	Medford (a).....	15.5
<i>Kentucky.</i>		Miles City.....	7.6	Cisco.....	5.2	Medford (b).....	9.0
Mount Sterling.....	Trace.	<i>Nebraska.</i>		Grouse Creek.....	6.0	Menomonee.....	7.7
Sandy Hook.....	Trace.	Agee.....	5.0	Heber.....	15.5	Milwaukee.....	7.4
<i>Maine.</i>		Arberville.....	5.0	Kelton.....	5.5	Neillsville.....	12.0
Easton.....	10.0	David City.....	6.0	Levan.....	5.0	New Holstein.....	18.5
Mayfield.....	6.0	Geneva.....	6.0	Loa.....	10.8	Oconomowoc.....	9.5
<i>Maryland.</i>		Genoa.....	6.0	Moab.....	11.0	Oconto.....	12.0
Mount Saint Marys.....	3.5	Hartington.....	9.0	Parowan.....	9.0	Osceola.....	7.8
<i>Massachusetts.</i>		Marquette.....	7.5	Promontory.....	6.5	Pepin.....	8.0
Monroe.....	13.5	Springview.....	5.0	Singletree.....	26.0	Portage.....	18.5
<i>Michigan.</i>		Stanton.....	5.8	Terrace.....	7.0	Prairie du Chien.....	5.5
Allegan.....	12.5	Valentine.....	5.1	Thistle.....	10.6	Raymond.....	12.5
Alma.....	14.0	<i>Nevada.</i>		<i>Vermont.</i>		Reedsburg.....	8.5
Bear Lake.....	13.0	Fenelon.....	6.5	Hartland.....	8.5	Sharon.....	14.0
Bellaire.....	13.4	Halleck.....	5.0	Irishburg.....	8.2	Sparta (b).....	11.2
Benton Harbor.....	6.8	Palmetto.....	7.0	Jacksonville.....	9.2	Stevens Point.....	17.0
Berrien Springs a.....	14.0	South Camp.....	5.5	Norwich.....	7.0	Valley Junction.....	10.8
Berrien Springs b.....	7.0	Stofel.....	10.0	Simonsville.....	10.0	Viroqua.....	9.0
Boon.....	30.7	Tecoma.....	5.5	Stratford.....	9.5	Watertown.....	8.8
Calumet.....	30.2	Toano.....	12.0	Vernon.....	6.0	Waukesha.....	6.5
Cheboygan.....	19.5	Tuscarora.....	25.0	Wells.....	6.2	Westfield.....	13.2
Escanaba.....	7.1	<i>New Hampshire.</i>		Woodstock.....	11.0	Weston.....	12.0
Fairview.....	5.0	Alstead.....	7.0	<i>Virginia.</i>		Whitehall.....	10.0
Fitchburg.....	12.0	Antrim.....	5.0	Dale Enterprise.....	2.5	<i>Wyoming.</i>	
Gaylord.....	68.0	Berlin Mills.....	10.0	Blaine.....	7.0	Big Horn Ranch.....	14.2
Grand Haven.....	10.7	Bethlehem.....	5.5	Bridgeport.....	10.2	Camp Pilot Butte.....	9.0
Grand Rapids.....	10.0	Concord a.....	5.5	Colefax.....	20.4	Fort McKinney.....	7.2
Hanover.....	6.0	Dublin.....	7.0	Crystal Springs.....	5.0	Fort Yellowstone.....	22.9
Harbor Springs.....	20.0	Grafton.....	8.0	Davenport.....	6.0	Lander.....	5.7
Hart.....	11.5	Plymouth.....	6.5	Dayton.....	5.5	Saratoga.....	7.0
Hastings.....	11.9	Sanbornston.....	6.5	East Chatham.....	6.0	Sheridan.....	14.0
Kalamazoo.....	7.5	West Milan.....	7.0	<i>Washington.</i>		Sundance.....	5.0
Lansing.....	5.5	<i>New Jersey.</i>		<i>Washington.</i>			
Lathrop.....	10.0	Deckertown.....	1.2	<i>Washington.</i>			
Lodi.....	29.0	<i>New Mexico.</i>		<i>Washington.</i>			
Marquette.....	31.3	Chama.....	8.5	<i>Washington.</i>			
Mayville.....	5.5	Sulphur Hot Springs.....	5.5	<i>Washington.</i>			
Mottville.....	8.0	<i>New York.</i>		<i>Washington.</i>			
Olivet.....	8.5	Alfred Center.....	12.0	<i>Washington.</i>			
Ovid.....	5.5	Angelica.....	10.0	<i>Washington.</i>			
Parkville.....	12.0	Arcade.....	23.5	<i>Washington.</i>			
Rockland.....	37.0	Baldwinsville.....	5.0	<i>Washington.</i>			
Saint Ignace.....	8.5	Brookfield.....	7.0	<i>Washington.</i>			
Sault Ste. Marie.....	30.6	Eden Center.....	28.0	<i>Washington.</i>			
Thornville.....	6.0	Friendship.....	9.8	<i>Washington.</i>			
Vandalia.....	11.5	Humphrey.....	24.0	<i>Washington.</i>			
Williamston.....	8.0	Le Roy.....	9.0	<i>Washington.</i>			
<i>Minnesota.</i>		Lowville.....	15.0	<i>Washington.</i>			
Ada.....	11.0	Number Four.....	19.8	<i>Washington.</i>			
Albert Lea.....	7.0	Oswego.....	5.5	<i>Washington.</i>			
Alexandria a.....	8.5	Palermo.....	6.2	<i>Washington.</i>			
Alexandria b.....	6.0	Port Jervis.....	7.0	<i>Washington.</i>			
Blooming Prairie.....	5.5	Rochester.....	6.1	<i>Washington.</i>			
Caledonia.....	13.9	South Canisteo.....	8.4	<i>Washington.</i>			
Cambridge.....	6.0	Turin.....	22.8	<i>Washington.</i>			
Carver.....	5.0	Varysburg.....	7.5	<i>Washington.</i>			
Clear Lake.....	7.0	Wedgwood.....	6.0	<i>Washington.</i>			
Clearwater.....	5.6	Willeyton.....	1.5	<i>Washington.</i>			
Duluth.....	6.4	<i>North Carolina.</i>		<i>Washington.</i>			
Farmington.....	11.5			<i>Washington.</i>			

DEPTH OF SNOW ON GROUND.

The depth of unmelted snow lying on the ground on the first Monday of each week during the winter season is shown by a series of weekly maps published by the Weather Bureau, beginning with Monday, December 4, 1893, based upon telegraphic reports received from a comparatively few selected stations.

The accompanying chart, No. VII, gives the depth in inches of snow lying on the ground on November 30 at nearly a hundred stations, selected from among several hundred that report the presence of more or less snow. The irregularities of distribution are so great that it seems hardly practicable to draw lines of equal snow depth, and yet an attempt has been made to indicate the zone where a trace of snow is still left on the ground. The line of 5-inch depth has also been

drawn through regions where reports are sufficiently numerous to indicate that the general average depth is not less than that amount. The maximum depths are from 12 to 20 inches in the upper peninsula of Michigan; from 5 to 36 inches in the western portion of the lower peninsula of Michigan; from 10 to 12 inches in northern Wisconsin and northern Minnesota; from 6 to 20 inches in western Montana, northern Idaho, and eastern Washington; from 10 to 40 inches in the mountainous parts of central Colorado. The data for the 15th shows that on that date the maximum depths of snow were: 20 in Colorado; 10 in Upper and Lower Michigan; 10 to 18 in western New York; and 4 in Vermont.

The following table shows the depth of snow on the ground on the 15th and the 30th of the month for stations reporting 5 inches, or more:

Depth of snow on ground on the 15th and at the close of the month.

State and stations.	15th.	30th.	State and stations.	15th.	30th.
<b>Colorado.</b>			<b>Minnesota.—Cont'd.</b>		
Breckenridge.....	6.0	30.0	Winona.....	0.0	7.0
Climax.....	20.0	39.0	<b>Montana.</b>		
Dumont.....	0.0	0.0	Choteau.....	0.0	10.0
Gold Hill.....	10.0	10.0	Elk Park.....	5.0	20.0
Loveland.....	3.0	6.0	Fort Logan.....	0.0	6.0
Moraine.....	0.0	6.0	Grant Falls.....	0.0	5.4
Red Cliff.....	(?)	12.0	Helena.....	0.0	6.4
Steamboat Spring.....	0.0	5.0	Martinsdale.....	0.0	6.0
<b>Idaho.</b>			Miles City.....	0.0	5.0
Kootenai.....	9.0	13.5	<b>Nebraska.</b>		
Lake.....	0.0	12.0	Agee.....	0.0	5.0
Murray.....	6.0	18.0	Hartington.....	0.0	7.0
<b>Illinois.</b>			Lynch.....	0.0	5.0
Dixon.....	0.0	5.0	<b>New Hampshire.</b>		
Oregon.....	0.0	5.5	Berlin Mills.....	6.0	Trace.
Riley.....	0.0	8.0	<b>New York.</b>		
Sycamore.....	0.0	8.0	Arcade.....	10.0	Trace.
Winnebago.....	0.0	8.0	Eden Center.....	18.0	0.0
<b>Iowa.</b>			Humphrey.....	12.0	10.0
Audubon.....	0.0	6.0	Varysburg.....	6.0	0.0
Belle Plaine.....	0.0	6.0	<b>North Dakota.</b>		
Cedar Rapids.....	0.0	6.5	Fargo.....	0.0	6.0
Charles City.....	1.0	5.0	McKinney.....	0.0	5.0
Des Moines.....	0.0	8.0	Power.....	0.0	5.0
Dubuque.....	Trace.	6.5	Sheyenne.....	1.0	10.0
Grand Meadow.....	0.0	7.0	Woodbridge.....	0.0	6.0
Hampton.....	0.0	0.5	<b>South Dakota.</b>		
Iowa City.....	0.0	5.0	Huron.....	0.0	5.5
Larrabee.....	2.0	5.0	<b>Washington.</b>		
Mechanicsville.....	0.0	9.0	Bridgeport.....	0.2	9.5
Monticello.....	0.0	8.0	Davenport.....	4.0	6.0
Newton.....	0.0	6.0	Ellensburg.....	0.0	9.0
Tipton.....	0.0	6.0	Fort Simcoe.....	0.0	14.0
<b>Maine.</b>			Fort Spokane.....	Trace.	11.0
Easton.....	0.0	8.0	Lakeside.....	0.0	11.0
<b>Michigan.</b>			Moxee Valley.....	0.0	5.0
Bear Lake.....	2.5	6.0	Pullman.....	0.0	6.0
Bellaire.....	6.4	10.0	Rosalia.....	0.0	6.0
Berrien Springs a.....	1.0	5.0	Waterville.....	0.0	5.0
Berrien Springs b.....	0.0	5.0	West Ferndale.....	0.0	5.0
Boon.....	4.0	17.0	<b>Wisconsin.</b>		
Calumet.....	5.0	20.0	Amherst.....	0.0	14.0
Cheboygan.....	5.0	7.0	Baraboo.....	0.0	7.0
Gaylord.....	10.0	35.0	Bellefonte.....	Trace.	8.0
Harbor Springs.....	5.0	12.0	Beloit.....	0.0	8.0
Harrison.....	1.0	6.0	Butternut.....	Trace.	6.0
Lathrop.....	0.0	10.0	Cadiz.....	0.0	5.0
Lewiston.....	1.0	10.0	City Point.....	1.0	10.0
Lodi.....	(?)	12.5	Delavan.....	0.0	9.8
Marquette.....	0.1	12.2	Estella.....	0.0	10.5
Sault Ste. Marie.....	10.2	12.0	Florence.....	0.0	12.0
<b>Minnesota.</b>			Fond du Lac.....	0.0	10.0
Ada.....	0.0	11.0	Grantsburg.....	0.0	7.0
Alexandria a.....	0.0	7.0	Green Bay.....	0.0	8.1
Alexandria b.....	0.0	6.0	Harvey.....	0.0	8.5
Bloomington.....	0.5	5.5	Hayward.....	0.0	7.0
Caledonia.....	0.0	7.0	Koopencik.....	0.0	12.0
Cambridge.....	0.0	5.0	Madison.....	0.0	5.0
Clear Lake.....	0.0	6.0	Medford b.....	0.0	9.0
Collegeville.....	0.0	9.0	Menomonie.....	Trace.	5.0
Farmington.....	0.0	8.0	Neillsville.....	0.0	12.0
Grand Meadow.....	Trace.	5.0	New Holstein.....	0.0	14.0
Lake Winnibigoshish.....	0.0	10.0	Oconomowoc.....	0.0	6.0
Leech Lake.....	0.2	7.0	Oscoda.....	0.0	6.0
Long Prairie.....	0.0	13.5	Pepin.....	0.0	7.0
Maple Plain.....	0.0	7.0	Reedsburg.....	0.0	8.0
Marfield.....	1.2	8.0	Sharon.....	Trace.	10.0
Maseppa.....	0.0	6.0	Shawano.....	0.0	8.0
Minneapolis (W. B.).....	Trace.	5.5	Sparta.....	0.0	5.2
Minneapolis a.....	0.2	5.0	Stevens Point.....	Trace.	8.0
Minneapolis b.....	Trace.	6.0	Valley Junction.....	Trace.	5.0
Minneapolis c.....	0.0	5.0	Viroqua.....	0.0	9.0
Minnesota City.....	Trace.	5.0	Watertown.....	0.0	6.5
Pokegama Falls.....	1.0	5.0	Waukesha.....	0.0	6.5
Red Wing.....	Trace.	5.5	Westfield.....	0.2	6.0
Royalton.....	0.0	8.0	Weston.....	0.0	10.0
Saint Charles.....	0.0	7.0	Whitehall.....	3.0	9.0
Saint Cloud.....	0.0	8.0	<b>Wyoming.</b>		
Saint Paul.....	0.0	5.4	Big Horn Ranch.....	0.0	8.0
Sank Center.....	Trace.	7.0	Sheridan.....	0.0	5.0
Wabasha.....	0.0	6.0			

## HAIL.

Hail was reported as follows: 1st, 4th, and 6th, Nevada. 7th, Oklahoma and Texas. 8th, Texas. 9th, Washington. 17th, California. 19th, Arizona. 20th, Louisiana. 21st, Georgia, Oregon, and Tennessee. 24th, California and Nevada. 25th, Arizona, California, Louisiana, and Nevada. 26th, Alabama, Louisiana, and Tennessee. 27th, Alabama and Tennessee. 28th, Utah. 29th, Ohio.

## SLEET.

Sleet was reported as follows: 1st, Kansas, Maryland, and Minnesota. 2d, Illinois and Michigan. 3d, Kansas and Missouri. 4th, Connecticut, Massachusetts, and New Jersey. 6th, New York and South Dakota. 9th, Idaho and Washington. 10th, Colorado and South Dakota. 11th, Iowa, Kansas, and Nebraska. 12th, Iowa, Kansas, Missouri, and Wisconsin. 13th, Colorado and Wisconsin. 14th, Alabama, Arkansas, Kentucky, Mississippi, Nebraska, North Carolina, and Texas. 15th, Kentucky, Massachusetts, New Hampshire, Pennsylvania, and Washington. 16th, Idaho, Montana, and South Dakota. 17th, California, North Carolina, and South Dakota. 18th, Arizona and Ohio. 19th, Arizona, Tennessee, and Washington. 20th, Arkansas, Illinois, Iowa, Massachusetts, Montana, Nebraska, North Carolina, Virginia, and Washington. 21st, Georgia, Idaho, Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, New York, North Carolina, Ohio, South Carolina, South Dakota, Virginia, Washington, and Wisconsin. 22d, Michigan and Mississippi. 23d, Michigan, Nebraska, Tennessee, Utah, and Virginia. 24th, California, Iowa, Nevada, and North Carolina. 25th, Arizona, Arkansas, Iowa, Kansas, Missouri, Nevada, South Dakota, and Utah. 26th, Arkansas, Colorado, Illinois, Iowa, Michigan, Minnesota, Missouri, North Carolina, Ohio, Wisconsin, and Wyoming. 27th, Illinois, Iowa, Maryland, Michigan, New York, North Carolina, Ohio, West Virginia, and Wisconsin. 28th, Idaho, Indiana, Iowa, Maryland, Michigan, Nebraska, New York, Ohio, and Wisconsin. 29th, Idaho, Illinois, Iowa, Maryland, Missouri, Nebraska, New York, Washington, and Wisconsin. 30th, Idaho, Iowa, Kansas, Nebraska, and Washington.

## FOG.

On the 7th during a dense fog over Lake Huron 2 vessels collided off Point aux Barques. Both vessels sank in a short time, and the crew of one, consisting of 24 persons, was drowned.

On the 9th at Grand Haven, Mich., a dense fog interrupted navigation on the lake. At Chicago, Ill., the fog prevailed during the 8th and 9th. Traffic on the streets and railroads was seriously interfered with and a number of wrecks occurred. Navigation on the lake and river was almost entirely suspended. At Detroit, Mich., the dense fog delayed navigation in the morning.

On the 11th at Cincinnati, Ohio, a dense fog caused interruptions to street traffic, and river navigation was suspended.

## WET AND DRY SEASONS.

The character of the season as to precipitation in its relation to agriculture is shown in the following extracts and reports:

**California.**—As winds from the interior are frequently reported to have produced great drought and destruction among tender fruits in California, the following items have been collected with regard to the remarkable northerly gale of the 17th; whenever such winds descend into valleys from the summits of the higher ridges they have the nature of the Föhn wind, being warm and dry, as at Napa City; but under other circumstances they may descend more slowly and become very cold, dry winds; in either case the dryness is apt to produce such rapid evaporation from the tender leaf surface that great injury is done to plants.

Fallbrook: the wind shifted from southerly to cold northerly on the 17th,



and at sunset snow was falling at points above 900 feet altitude; this is the first snowstorm since January, 1881. Julian: a rainstorm with west wind on the 17th; at sunset the wind shifted to east and snowfall began. Lick Observatory: the cold northwest winds of the 16th and 17th gave maximum velocities of 80 miles hourly, and gusts of 100 miles. Lodi: 16th, 8.30 p. m., north wind began, increasing to a gale by midnight. Napa City: 16th, 9.55 p. m., wind suddenly changed to a northerly gale; temperature rose 14° in five minutes and then gradually declined. Niles: on the 17th, late in the evening, strongest wind experienced for 42 years. Pasadena: 17th, 9 p. m. to 9.30 p. m., temperature fell from 55.5° to 39°; wind changed from light southeast to high northwest, with heavy rain and hail and followed by light frost. San Jacinto: snowstorm 17th from 5 to 6 p. m. Turlock: destructive northerly gale on 17th.

**Georgia.**—Rainfall has been deficient in the interior and the soil exceptionally dry, and therefore warm, so that the more hardy annual vegetation had not been killed by the end of the month.

**Indiana.**—Traces of snow were noted on the 15th and a few other days, and the weather was exceedingly favorable to farm work and crops. Winter wheat is in the best condition to stand severe winter weather, being deeply rooted and vigorous.

**Maryland.**—The ground is in fine condition and weather very favorable for farm work.

**Mississippi.**—Rains were more frequent than during October, but had very little effect in retarding field work; most of the crops have been harvested under the most favorable circumstances.

**Nevada.**—The lack of sufficient moisture has allowed the feed to dry up

and, in some localities, considerable anxiety is felt for the stock; the record for the snowfall was very light compared with November, 1893.

**Ohio.**—Precipitation was deficient but well distributed and generally sufficient for cereals; snowfall was light but fell opportunely and gave considerable protection to the wheat.

**Oklahoma.**—The dry weather of October caused immense prairie fires, and the wet weather and severe frosts of November prevented any growth of grass, hence the cattle ranges are poor.

**South Carolina.**—The soil is favorable for seeding wheat and oats; copious showers kept the ground in good condition for working and also aided germination.

**South Dakota.**—Up to the 20th the ground averaged bare although snows had fallen and, therefore, stock could generally feed on the range; after the 20th snows were more frequent and generally staid on the ground and it began to be necessary to feed the stock.

**Virginia.**—The rainfall near the coast was nearly twice the normal, decreasing to the western portion of the state, where it was less than half the normal; the weather has generally been favorable for farm work.

**Wisconsin.**—The snowfall has been heavy and the total precipitation quite evenly and advantageously distributed, although the first ten days were not specially favorable to agriculture, as the ground was too dry for fall seeding. After the snow fell it gave complete protection to growing grain during the severely cold weather that prevailed during the last ten days of the month.

**Wyoming.**—Grass on the ranges has been cropped rather short; if the present early snows are reinforced by additional snowfall it will go hard with the cattle on the ranges.

# WIND.

The prevailing winds in November, 1893, viz., those that were recorded most frequently, are shown on Chart II by arrows flying with the wind. Northwest winds prevail as usual in the Northwest and Missouri Valley and easterly winds in the south Atlantic and Gulf states.

## HIGH WINDS. (In miles per hour.)

Wind velocities of 50 miles, or more, per hour were reported at regular stations of the Weather Bureau as follows:

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Amarillo, Tex. ....	11	60	n.	Keeler, Cal. ....	18	60	ne.
Do .....	28	52	sw.	Kittyhawk, N. C. ....	8	58	ne.
Do .....	30	50	n.	Do .....	9	54	n.
Block Island, R. I. ....	10	50	ne.	Do .....	27	51	se.
Buffalo, N. Y. ....	22	50	sw.	Lander, Wyo. ....	28	50	w.
Do .....	28	50	w.	Lexington, Ky. ....	29	56	sw.
Colorado Springs, Colo. .	21	65	nw.	Pensacola, Fla. ....	27	56	se.
Do .....	30	57	nw.	Pikes Peak, Colo. ....	21	64	w.
Chicago, Ill. ....	17	51	sw.	Do .....	23	84	nw.
Dodge City, Kans. ....	25	54	se.	Do .....	25	84	sw.
Eastport, Me. ....	22	53	se.	Do .....	29	90	sw.
Fort Canby, Wash. ....	3	54	se.	Do .....	30	104	sw.
Do .....	5	52	s.	Tatoosh Island, Wash. .	6	50	s.
Do .....	6	68	s.	Do .....	13	50	e.
Do .....	7	70	s.	Do .....	22	60	e.
Do .....	19	60	s.	Do .....	23	80	e.
Do .....	20	64	s.	Do .....	25	50	nw.
Do .....	22	58	se.	Do .....	28	50	e.
Do .....	23	60	s.	Do .....	29	57	e.
Do .....	24	72	sw.	Winnemucca, Nev. ....	24	57	w.
Do .....	25	72	se.	Do .....	25	58	sw.
Do .....	26	89	se.				

## LOCAL STORMS.

**6-8th.**—A heavy storm of wind and rain prevailed along the Pacific coast from northern Washington to San Francisco, Cal. At Fort Canby, Wash., the wind reached a maximum velocity of 68 miles per hour. Near Lake Cushman, Wash., damage was done by the heavy rain. Railroad traffic was delayed for several days and trains on the Northern Pacific Railroad did not run until the 10th. Six spans of the Northern Pacific trestle near Clarks Fork Station, Mont., were washed out on the 8th.

**8-9th.**—At Norfolk, Va., a heavy northeast storm began the early morning of the 8th and continued until the morning of the 9th. The wind reached a maximum velocity of 34 miles per hour, and the rainfall was exceptionally heavy, 5.77

inches falling during the storm. Minor damage was done to buildings.

**13th.**—An unusually severe storm prevailed in Delaware. A number of houses were blown down and one person was killed. Several wrecks occurred in Chesapeake Bay.

**15-16th.**—Heavy snow storms prevailed in New York and Pennsylvania. At Oswego, N. Y., snow began the evening of the 15th and continued until the early morning of the 16th, accompanied by high wind. A schooner broke adrift from the outer breakwater, and a tug going to her assistance was blown into shoal water. Both vessels were a total loss, and the captain of the tug was drowned. At 3.49 a. m. of the 16th a violent gust struck the city, attended by a heavy fall of sleet. The storm seemed to be a diminutive tornado, its approach and departure being attended by a heavy rumbling sound like a train of cars. No exceptionally high wind was recorded at the Weather Bureau office. A house was partially destroyed, and in the same vicinity other damage was done. A schooner in the harbor was damaged during the passage of this storm, the captain of the vessel reporting the wind very high. At Dunkirk, N. Y., the snowfall was very heavy. Business was interrupted and railroad trains delayed.

**17th.**—A northwest gale occurred on Lakes Superior, Huron, and Michigan, and on Lake Erie the wind was strong from the southwest. No boats ventured out from Buffalo. At the head of Lake Superior the storm was accompanied by snow. Heavy rain and wind storms prevailed in central California. At San Francisco high north wind in the early morning reached a maximum velocity of 47 miles per hour. Several houses were unroofed and damage was done to houses in the bay. At Sonoma high wind blew roofs from barns and did other damage. In Stanislaus County the gale was very destructive. At Centerville a very severe storm in the early morning did a great amount of damage. At Mount Hamilton the wind reached a maximum velocity of 80 miles per hour, with gusts of over 100 miles. At Lodi the storm began the night of the 16th and increased to a gale at midnight; outbuildings were unroofed and other damage done. At Kelseyville the gale damaged trees. At Fruitvale a house in course of erection was demolished and fences and trees blown down.

**21st.**—The first blizzard of the season occurred in Minnesota on November 21, and advanced southeastward into Illi-

nois. At Detroit it was noticed that the snow flakes were of enormous size, the diameter being little smaller than a silver dollar; the air was warm and the snow soon turned to rain. A gust of wind moving in a narrow path passed over the island 2 miles north of Hatteras, N. C., at 8.50 p. m. Minor damage was done. Heavy gales and snow prevailed over the Great Lakes and the upper Mississippi valley. At nearly all the Lake stations the storm continued during the 22d. All vessels remained in port and a number of out vessels were over due. The steamer "Arabia" arrived at Bayfield, Wis., on the 22d and reported the storm on Lake Superior the worst in years. The wind blew a furious gale, driving a dense fall of snow before it. At Grand Haven, Mich., snow began at 11 a. m., 21st, and continued until the 23d. The wind increased to high at 7 p. m., 21st, with heavy squalls, and the gale continued throughout the greater portion of the 22d; a heavy sea was running. A schooner was caught in the storm and damaged, and another small schooner was beached 5 miles from port.

**24th.**—A heavy thunderstorm passed east and south of Eureka, Cal. Considerable damage was done to the jetty work at the mouth of Humboldt Bay. Damage was also done to electric wires.

**26th.**—A severe storm (possibly a tornado) passed over Port Eads, La., and vicinity. With one exception every house on both sides of the river was flooded. Damage was done to outhouses and fences; the water rose two feet higher than ever before.

**27th.**—At Paterson, N. J., a heavy windstorm blew down fences and trees. A heavy thunder, wind, and rain storm passed over Pensacola, Fla., in the early morning. The wind reached a maximum velocity of 56 miles per hour. A house was struck by lightning; several vessels dragged their anchors, and a large amount of timber was cast adrift in the bay.

**28th.**—At Boston, Mass., rain began in the early morning and ended 10 a. m., attended by high wind, reaching a maximum velocity of 39 miles per hour. Considerable damage was done to shipping by high wind and heavy seas. A schooner reported foundered off Dread Ledge, Swampscott. At Egg Rock, off Nahant, Mass., a southeast gale, with heavy rain, prevailed. A vessel was sunk about three-fourths of a mile from station and all persons on board were drowned. A report from Eureka, Cal., states that heavy rains prevailed along the Mad and Eel rivers and damage was done by flood.

**29th.**—A severe windstorm at South Fork, Ky., blew down timber and fences.

### INLAND NAVIGATION.

#### STAGE OF WATER IN RIVERS.

The following table shows the danger-points at the various river stations; the highest and lowest stages for the month, with the dates of occurrence; and the monthly ranges:

*Heights of rivers above low-water mark, November, 1893.*

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Red River.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	
Shreveport, La.	29.3	—1.0	30	—2.5	17-21	1.5
<i>Arkansas River.</i>						
Port Smith, Ark.	22.0	6.4	30	0.0	23-25	6.4
Little Rock, Ark.	23.0	7.4	30	2.9	11, 20	4.5
<i>Missouri River.</i>						
Port Buford, N. Dak.	25.0	8.0	25	5.9	23	2.1
Bismarck, N. Dak.	75.0					
Pierre, S. Dak.	13.0					
Sioux City, Iowa	18.7	6.6	15	6.0	10, 20-23	0.6
Omaha, Nebr.	18.0					
Kansas City, Mo.	21.0	6.3	21, 22	4.8	30	1.5
<i>Mississippi River.</i>						
Saint Paul, Minn.	14.0	3.0	1, 2	0.6	26	2.4
La Crosse, Wis.	10.0	2.7	28-30	1.6	25	1.1
Dubuque, Iowa	16.0	2.7	1	0.9	29, 30	1.8
Davenport, Iowa	15.0	1.6	1-5	0.0	28-30	1.6
Keokuk, Iowa	14.0	1.4	2, 3	—1.9	27, 30	3.3
Hannibal, Mo.	17.0	1.9	1-4	0.3	28-30	1.6
Saint Louis, Mo.	30.0	3.4	6	2.5	30	0.9
Cairo, Ill.	40.0	7.6	2-4	5.3	30	2.3
Memphis, Tenn.	33.0	4.6	1	3.0	29, 30	1.6
Vicksburg, Miss.	41.0	3.6	3	0.4	19, 20	3.2
New Orleans, La.	13.0	4.2	27, 28	2.9	9	1.3
<i>Ohio River.</i>						
Parkersburg, W. Va.	38.0	7.3	10	2.8	19, 21	4.5
Cincinnati, Ohio	45.0	13.8	8, 9	6.4	27	7.4
Louisville, Ky.	24.0	6.9	10, 11	4.0	26, 27	2.9
<i>Cumberland River.</i>						
Nashville, Tenn.	40.0	3.3	29, 30	0.6	2, 3	2.7
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	4.8	12	2.3	9	2.5
Knoxville, Tenn.	29.0					
<i>Monongahela River.</i>						
Pittsburg, Pa.	22.0	8.0	7	5.3	16	2.7
<i>Susquehanna River.</i>						
Augusta, Ga.	32.6	8.2	30	5.7	3	2.5
<i>Willamette River.</i>						
Portland, Oregon	15.0	14.0	30	3.0	2, 3	12.0
<i>Sacramento River.</i>						
Harrisburg, Pa.	17.0	3.7	30	1.6	22, 23, 26, 27	2.1
<i>Alabama River.</i>						
Montgomery, Ala.	48.0	2.2	29	0.1	1-3	2.1
<i>James River.</i>						
Lynchburg, Va.	18.0	3.4	29	0.8	26, 27	2.6
<i>Sacramento River.</i>						
Red Bluff, Cal.	22.0					
Sacramento, Cal.	25.0	18.3	29	7.5	5.6	10.6
<i>Des Moines River.</i>						
Des Moines, Iowa	19.0	3.1	1	2.9	3-17, 19	0.2

\* For 25 days.

† For 23 days.

‡ For 26 days.

§ For 20 days.

#### FLOODS.

The above table shows that during the month of November the only rivers that experienced special high waters were the Willamette River at Portland, Oregon, on the 30th, and the Sacramento River at Sacramento, Cal., on the 29th. The following additional report has been received:

The Columbia rose 6 feet between the 3d and 12th at The Dalles, Oregon, and an erroneous newspaper report of a rise of 6 feet in 12 hours should be corrected accordingly.

#### CLOSING OF NAVIGATION.

The dates of closing of navigation by ice in rivers and harbors are reported as follows:

**Black River.**—Port Huron, Mich., thin floating ice 24th; frozen over 25th.

**Delaware River.**—Trenton, N. J., canal frozen 26th.

**Grand River.**—Lansing, Mich., closed 23d.

**Hudson River.**—Albany, N. Y., ice on river 26th; ice floating down 27th.

**Illinois River.**—Beardstown, Ill., frozen 23d.

**Manitowoc River.**—Manitowoc, Wis., closed 14th.

**Minnesota River.**—Belle Plaine, Minn., covered with thin ice 20th.

**Mississippi River.**—Saint Cloud, Minn., river frozen 18th. Saint Paul, Minn., thin floating ice 23d; gorged, and frozen above the bridge, 24th; frozen, except at the foot of Jackson street, 30th. Hastings, Minn., closed 18th. Red Wing, Minn., frozen 24th. Winona, Minn., frozen 29th. North McGregor, Iowa, gorged 24th. Dubuque, Iowa, frozen up 24th and navigation closed; river ice broke up 28th. La Crosse, Wis., much floating ice 19th to 23d; frozen below, 28th; frozen above, 30th; Black River frozen up 25th. Burlington, Iowa, frozen over and closed 24th, earlier than for many years. Le Claire, Iowa, running ice 22d; frozen up 23d. Muscatine, Iowa, floating ice 23d. Davenport, Iowa, floating ice 23d; full of ice 24th to 26th; frozen along shore 27th to 30th. Warsaw, Ill., full of floating ice 23d. Keokuk, Iowa, running ice 23d and 30th.

**Missouri River.**—Bismarck, N. Dak., river closed 23d. Sioux City, Iowa, running ice 15th; much floating ice 17th to 20th and 22d to 30th; river channel nearly closed 24th; river gauge frozen up. Plattsmouth, Nebr., floating ice 15th.



## Thunderstorms and auroras, November, 1893.

States.	No. of stations.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	Total.
Alabama	53	T.	A.																														4 T.
Arizona	49	T.	A.																														0 T.
Arkansas	43	T.	A.																														3 T.
California	299	T.	A.																														8 T.
Colorado	77	T.	A.																														0 T.
Connecticut	25	T.	A.																														14 T.
Delaware	5	T.	A.																														1 T.
District of Columbia	4	T.	A.																														0 T.
Florida	35	T.	A.																														0 T.
Georgia	64	T.	A.																														30 T.
Idaho	12	T.	A.																														0 T.
Illinois	53	T.	A.																														10 T.
Indiana	40	T.	A.																														1 T.
Indian Territory	6	T.	A.																														5 T.
Iowa	75	T.	A.																														30 T.
Kansas	71	T.	A.																														5 T.
Kentucky	35	T.	A.																														3 T.
Louisiana	47	T.	A.																														42 T.
Maine	19	T.	A.																														0 T.
Maryland	26	T.	A.																														20 T.
Massachusetts	82	T.	A.																														13 T.
Michigan	68	T.	A.																														24 T.
Minnesota	70	T.	A.																														19 T.
Mississippi	41	T.	A.																														22 T.
Missouri	95	T.	A.																														50 T.
Montana	18	T.	A.																														4 T.
Nebraska	74	T.	A.																														4 T.
Nevada	45	T.	A.																														6 T.
New Hampshire	29	T.	A.																														1 T.
New Jersey	56	T.	A.																														15 T.
New Mexico	30	T.	A.																														31 T.
New York	79	T.	A.																														0 T.
North Carolina	52	T.	A.																														4 T.
North Dakota	35	T.	A.																														5 T.
Ohio	130	T.	A.																														2 T.
Oklahoma	9	T.	A.																														14 T.
Oregon	60	T.	A.																														1 T.
Pennsylvania	78	T.	A.																														0 T.
Rhode Island	9	T.	A.																														2 T.
South Carolina	49	T.	A.																														1 T.
South Dakota	44	T.	A.																														0 T.
Tennessee	43	T.	A.																														7 T.
Texas	77	T.	A.																														0 T.
Utah	33	T.	A.																														35 T.
Vermont	14	T.	A.																														0 T.
Virginia	35	T.	A.																														1 T.
Washington	41	T.	A.																														2 T.
West Virginia	33	T.	A.																														2 T.
Wisconsin	55	T.	A.																														3 T.
Wyoming	12	T.	A.																														22 T.
Sums	3,505	T.	A.																														233 T.
																																	248 A.

NOTE.—Correction to October table: add 1 aurora, observed on the 2d at Greenfield Hill, Conn., to the total for that state.

Lynch, Nebr., navigation closed 22d. Yankton, S. Dak., running ice 22d; full of ice 23d; river closed 24th. Saint Joseph, Mo., slush ice in river 23d to 28th. Kansas City, Mo., much floating ice 24th.

*Monongahela River.*—Lock No. 4, Pa., frozen 26th; Pittsburgh, Pa., frozen 26th.

*Red River.*—Saint Vincent, Minn., frozen, and ferry discontinued, 18th.

*Ohio River.*—Wheeling, W. Va., floating ice 26th and 27th.

*Saint Croix River.*—Osceola Mills, Wis., frozen 25th.

*Susquehanna River.*—Harrisburg, Pa., slush ice 25th.

Lock Haven, Pa., thin ice 17th; clear 22d; frozen up 25th; clear 30th.

*Wabash River.*—Lafayette, Ind., frozen 24th.

*Wisconsin River.*—Stevens Point, Wis., frozen 15th.

*Lake Erie.*—Sandusky, Ohio, bay frozen 25th. Toledo, Ohio, ice in river 24th; river and bay frozen over and navigation hindered 25th; river free from ice 27th.

*Lake Michigan.*—Chicago, Ill., harbor frozen 25th.

*Lake Minnetonka.*—Minneapolis, Minn., frozen over 24th, the earliest date of freezing ever known.

*Lake Pepin.*—Lake Pepin, Wis., frozen 23d.

## ATMOSPHERIC ELECTRICITY.

### THUNDERSTORMS AND AURORAS.

The table on p. 327 shows in detail for November, 1893, (1) the number of stations from which meteorological reports were received; (2) the number of such stations reporting thunderstorms (T) and auroras (A), respectively, in each state and on each day of the month on which the phenomena were observed.

#### THUNDERSTORMS.

Description of the more severe thunderstorms reported for the month is given under "Local storms."

The dates on which reports were most numerous are the 1st, 2d, 3d, 15th, 20th, 24th, 26th, 27th, and 29th.

The dates on which they were least numerous are the 5th, 6th, 9th, 10th, 11th, 14th, 15th, 28th, and 30th.

The states from which the most numerous thunderstorm reports were received were Florida, 30; Louisiana, 42; Texas, 35.

#### AURORAS.

The evenings on which the full moonlight must have interfered with ordinary observations were the 20th to 28th, inclusive; on the remaining 21 evenings 240 observations of auroras are reported, or an average of 11 daily; the dates on which the reported number exceeded this average are the 1st, 2d, and 3d. During these three evenings an extensive auroral display occurred, and observations are at hand from the following states on one or more of these dates: Connecticut, Delaware, Idaho, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Pennsylvania, Rhode Island, South Dakota, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

The following table gives an abstract of auroral observations made on the evening of the 1st and morning of the 2d:

### Auroral display of November 1st.

Date.	Station.	Extent of display.		Remarks.
		Azimuth.	Altitude.	
1	Eastport, Me. ....	.....	30	Waves of light shooting from w. to e. and extending to zenith.
1	Boston, Mass. ....	.....	60	Glow changing to red and yellow.
1	Woods Holl, Mass. ....	110 to 250	20	Diffused white light.
1	New Haven, Conn. ....	145 to 215	30 to 90	Pale green color. Streamers at intervals nearly to zenith.
1	New London, Conn. ....	140 to 240	45 to 90	A diffused glow, resembling the dawn. About 12 streamers reaching an altitude of 55°.
1-2	Toms River, N. J. ....	135 to 225	90	Long narrow strips of pink, red, and white shot up to zenith.
1	Alpena, Mich. ....	90 to 270	35	Band of white light, with beams of pale straw color moving rapidly back and forth.
1	Boon, Mich. ....	.....	.....	Arch; beams of yellow light appearing and disappearing rapidly, a motion from w. to e.
1	Marquette, Mich. ....	225	90	Luminous patches; streamers to 20° s. of zenith.
1-2	Sault Ste. Marie, Mich. ....	135 to 270	40 to 90	Tea-green color. Waves of light moving from w. to e.
1	Minneapolis, Minn. ....	180 to 225	90	Streamers of white and rose-color nearly to zenith.
1-2	Bismarck, N. Dak. ....	110 to 250	40	Pale, diffused light, lasted until 2 a. m.
1	Rapid City, S. Dak. ....	.....	50	Beams resting on a dark segment.
1-2	Havre, Mont. ....	.....	10 to 45	Arch, with luminous beams to 30°. Bright flashes to zenith, moving with great rapidity, and having a rolling motion. At 1.20 a. m. flashes to 60° s. of zenith.
1	Miles City, Mont. ....	.....	.....	Diffused light; later an arch with bright flashes.
1	Rosalie, Wash. ....	150 to 240	25	Display resembling a hazy light, resting on a dark segment. A few small streamers in n. at 6.10 p. m.

### EARTH CURRENTS AND MAGNETIC STORMS.

Notwithstanding the extensive distribution of the aurora of November 1st no account has come to hand of any important disturbance of electric telegraph work, whence we must infer that the ground currents during this aurora were feeble in North America.

## STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for November, 1893, of the directors of the various state weather services:

### ALABAMA.

*Temperature.*—The mean was 0.8 above the normal; maximum, 86, at Maple Grove, 4th; minimum, 15, at Chepultepec and Decatur, 25th.

*Precipitation.*—The average was below the normal; greatest monthly, 5.14, at Thomasville; least monthly, 0.73, at Fort Deposit.

*Wind.*—Prevailing direction, north.—F. P. Chaffee, Local Forecast Official, Weather Bureau, Montgomery, director.

### ARIZONA.

*Temperature.*—The mean was 3.0 below the normal; maximum, 89, at Buckeye, 1st; minimum, 11, at Flagstaff, 20th; greatest monthly range, 64, at Crittenden; least monthly range, 40, at Peoria.

*Precipitation.*—The average was 0.20 below the normal; greatest monthly, 1.87, at Payson; least monthly, 0.00, at Teviston.

*Wind.*—Prevailing direction, southwest.—W. Burrows, Observer, Weather Bureau, Tucson, director.

### ARKANSAS.

*Temperature.*—The mean was 1.0 below the normal; maximum, 82, at Camden, 23d, and at Corning, 22d; minimum, 5, at Winslow, 4th; greatest monthly range, 74, at Keesees Ferry; least monthly range, 48, at Prescott.

*Precipitation.*—The average was 1.43 below the normal; greatest monthly, 5.71, at Madding; least monthly, 2.03, at Gaines Landing.

*Wind.*—Prevailing direction, south.—F. H. Clarke, Local Forecast Official.



*cial, Weather Bureau, Little Rock, director; G. G. Harkness, Observer, Weather Bureau, assistant.*

## CALIFORNIA.

*Temperature.*—The mean was 0.2 below the normal; maximum, 93, at Salton, 8th; minimum, 10, at Boca, 19th; greatest monthly range, 65, at Boca; least monthly range, 21, at Mokelumne Hill.

*Precipitation.*—The average was 0.13 above the normal; greatest monthly, 15.07, at Fort Ross; least monthly, trace, at Barstow and Nordhoff.

*Wind.*—Prevailing direction, west.—*J. A. Barwick, Observer, Weather Bureau, Sacramento, director.*

## COLORADO.

*Temperature.*—The mean was 1.0 below the normal; maximum, 98, at Downing, 27th; minimum, —21, at Lay, 22d.

*Precipitation.*—The average was 0.15 above the normal; greatest monthly, 6.45, at Climax; least monthly, 0.00, at Kit Carson.

*Wind.*—Prevailing direction, west.—*J. J. Gilligan, Observer, Weather Bureau, Denver, director.*

## FLORIDA.

*Temperature.*—The mean was normal; maximum, 88, at Archer, 3d and 4th, and at Plant City, 4th and 5th; minimum, 30, at Moseley Hall, 25th; greatest monthly range, 54, at Archer; least monthly range, 19, at Key West.

*Precipitation.*—The average was slightly below the normal; greatest monthly, 5.01, at Jupiter; least monthly, 0.48, at Key West.

*Wind.*—Prevailing direction, northeast.—*E. R. Demain, Observer, Weather Bureau, Jacksonville, director.*

## GEORGIA.

*Temperature.*—Maximum, 87, at Hawkinsville, 4th; minimum, 14, at Clayton, 25th; greatest monthly range, 66, at Hawkinsville; least monthly range, 33, at Dublin.

*Precipitation.*—Greatest monthly, 3.06, at Thomasville; least monthly, 0.63, at Dublin.

*Wind.*—Prevailing directions, northeast and east.—*Park Morrill, Local Forecast Official, Weather Bureau, Atlanta, director.*

## IDAHO.

*Temperature.*—Maximum, 68, at Martin, 9th; minimum, —9, at Paris, 22d; greatest monthly range, 75, at Paris; least monthly range, 36, at Moscow.

*Precipitation.*—Greatest monthly, 9.48, at Kootenai; least monthly, 0.07, at Fort Lemhi.

*Wind.*—Prevailing direction, northwest.—*J. H. Smith, Observer, Weather Bureau, Idaho Falls, director.*

## ILLINOIS.

*Temperature.*—The mean was 0.6 above the normal; maximum, 78, at Rushville, 1st, and at Greenville, 11th; minimum, —9, at Streator, 30th.

*Precipitation.*—The average was 1.00 below the normal; greatest monthly, 3.67, at Olney; least monthly, 0.76, at Havana.

*Wind.*—Prevailing direction, northwest.—*John Craig, Observer, Weather Bureau, Springfield, director.*

## INDIANA.

*Temperature.*—The mean was 0.7 below the normal; maximum, 74, at Marengo, 2d; minimum, 6, at Union City, Maury, Lafayette, and Delphi, 24th, and at Hawpatch, 24th and 25th; greatest monthly range, 67, at Worthington; least monthly range, 51, at Laconia.

*Precipitation.*—The average was 0.83 below the normal; greatest monthly, 6.50, at Muncie; least monthly, 1.40, at Vevay.

*Wind.*—Prevailing direction, southeast.—*Prof. H. A. Huston, Lafayette, director; C. F. R. Wappenhans, Local Forecast Official, Weather Bureau, assistant.*

## IOWA WEATHER AND CROP SERVICE.

*Temperature.*—The mean was about normal; maximum, 86, at Glenwood, 6th; minimum, —13, at Decorah and Spirit Lake, 30th; greatest monthly range, 92, at Decorah; least monthly range, 60, at Fort Madison.

*Precipitation.*—The average was 0.50 below the normal; greatest monthly, 2.56, at Davenport; least monthly, 0.05, at Villisca.—*J. R. Sage, Des Moines, director; G. M. Chappel, Local Forecast Official, Weather Bureau, assistant.*

## KANSAS.

*Temperature.*—The mean was 0.3 below the normal; maximum, 86, at Englewood, 2d, at Kiowa, 1st, and at Lakin, 15th; minimum, 0.00, at Lakin, 30th, and at Pleasant Dale, 23d; greatest monthly range, 86, at Lakin; least monthly range, 47, at Fort Riley.

*Precipitation.*—The average was 0.14 below the normal; greatest monthly, 2.12, at Sedan; least monthly, trace, at Bucklin, Coldwater, and Morton.

*Wind.*—Prevailing direction, south.—*T. B. Jennings, Observer, Weather Bureau, Topeka, director.*

## KENTUCKY.

*Temperature.*—Maximum, 79, at Harrodsburg, 2d; minimum, —2, at Catlettsburg, 25th; greatest monthly range, 70, at Harrodsburg; least monthly range, 62, at Catlettsburg.

*Precipitation.*—The average was 0.36 above the normal; greatest monthly, 4.44, at Bowling Green; least monthly, 1.00, at Middlesboro.

*Wind.*—Prevailing direction, northwest.—*Frank Burke, Local Forecast Official, Weather Bureau, Louisville, director.*

## LOUISIANA.

*Temperature.*—The mean was 0.9 below the normal; maximum, 80, at Cameron, 3d, and at Girard, 5th; minimum, 20, at Minden, 24th; greatest monthly range, 66, at Girard; least monthly range, 38, at Port Eads.

*Precipitation.*—The average was 2.10 below the normal; greatest monthly, 8.82, at Franklin; least monthly, 2.16, at Winnsboro.

*Wind.*—Prevailing direction, north.—*R. E. Kerkam, Local Forecast Official, Weather Bureau, New Orleans, director.*

## MARYLAND.

*Temperature.*—Maximum, 73, at Barren Creek Springs, 4th, and at Charlotte Hall, 30th; minimum, 0, at Sunnyside, 26th; greatest monthly range, 66, at Sunnyside; least monthly range, 37, at Cambridge.

*Precipitation.*—Greatest monthly, 8.27, at Valley Lee; least monthly, 2.01, at Cumberlanda.

*Wind.*—Prevailing direction, northwest.—*Dr. William B. Clark, Johns Hopkins University, Baltimore, director; Prof. Milton Whitney, Maryland Agricultural College, secretary and treasurer; C. P. Cronk, Observer, Weather Bureau, in charge.*

## MICHIGAN.

*Temperature.*—The mean was 0.5 below the normal; maximum, 75, at Rockland, 1st; minimum, —2, at Castle Falls, 25th; greatest monthly range, 73, at Rockland; least monthly range, 35, at Arbela.

*Precipitation.*—The average was 0.12 below the normal; greatest monthly, 7.36, at Gaylord; least monthly, 1.00, at Crystal Falls.

*Wind.*—Prevailing direction, southwest.—*E. A. Evans, Local Forecast Official, Weather Bureau, Detroit, director.*

## MINNESOTA.

*Temperature.*—The mean was 1.3 below the normal; maximum, 79, at Clearwater, 6th; minimum, —30, at Crookston, 28th; greatest monthly range, 100, at Royalton; least monthly range, 68, at Duluth.

*Precipitation.*—The average was 0.49 below the normal; greatest monthly, 1.74, at Caledonia; least monthly, 0.12, at Granite Falls.

*Wind.*—Prevailing direction, northwest.—*E. A. Beals, Observer, Weather Bureau, Minneapolis, director.*

## MISSISSIPPI.

*Temperature.*—The mean was 0.5 below the normal; maximum, 96, at Yazoo City, 11th; minimum, 16, at Aberdeen, 25th; greatest monthly range, 72, at Yazoo City; least monthly range, 45, at Moss Point.

*Precipitation.*—The average was 0.37 below the normal; greatest monthly, 6.90, at Hattiesburg; least monthly, 0.70, at Moss Point.

*Wind.*—Prevailing direction, north.—*R. J. Hyatt, Local Forecast Official, Weather Bureau, Vicksburg, director.*

## MISSOURI.

*Temperature.*—The mean was 0.7 below the normal; maximum, 79, at Fayette, 1st; minimum, —1, at McCune, 24th; greatest monthly range, 74, at McCune; least monthly range, 42, at Gordonville.

*Precipitation.*—The average was 1.07 below the normal; greatest monthly, 4.72, at Gayoso; least monthly, 0.08, at Vancleve.

*Wind.*—Prevailing direction, northwest.—*J. R. Rippey, Secretary, State Board of Agriculture, Columbia, director; E. H. Nimmo, Observer, Weather Bureau, assistant.*

## MONTANA.

*Temperature.*—The mean was 4.0 below the normal; maximum, 67, at Hogan, 1st, and at Miles City, 5th; minimum, —25, at Glasgow, 29th and 30th; greatest monthly range, 90, at Glasgow; least monthly range, 50, at Virginia City.

*Precipitation.*—The average was 0.54 below the normal; greatest monthly, 3.58, at Elk Park; least monthly, 0.29, at Virginia City.

*Wind.*—Prevailing direction, southwest.—*J. M. Sherier, Observer, Weather Bureau, Helena, director.*

## NEBRASKA.

*Temperature.*—The mean was —1.1 below the normal; maximum, 92, at Haigler, 3d; minimum, —10, at Agee, Lynch, Bassett, Creighton, and O'Neill, 30th; greatest monthly range, 95, at Ansley; least monthly range, 51, at Tecumseh.

*Precipitation.*—The average was 0.36 below the normal; greatest monthly, 1.26, at Hartington; least monthly, trace, at several stations.

*Wind.*—Prevailing direction, northwest.—*George E. Hunt, Local Forecast Official, Weather Bureau, Omaha, director.*

## NEVADA.

*Temperature.*—The mean was 1.9 below the normal; maximum, 74, at Belleville, 18th; minimum, —8, at Halleck, 22d; greatest monthly range, 66, at Stofiel; least monthly range, 46, at Edgwood and South Camp.

*Precipitation.*—The average was 0.06 below the normal; greatest monthly, 3.81, at Lewers Ranch; least monthly, 0.00, at Mills City.

*Wind.*—Prevailing direction, southwest.—*Prof. Charles W. Friend, Carson City, director; F. A. Carpenter, Observer, Weather Bureau, assistant.*

## NEW ENGLAND.

*Temperature.*—The mean was 0.2 below the normal; maximum, 72, at Vineyard Haven, 3d; minimum, -1, at Jacksonville, 27th; greatest monthly range, 61, at Taunton; least monthly range, 35, at Block Island.

*Precipitation.*—The average was 1.83 below the normal; greatest monthly, 3.93, at Long Plain; least monthly, 0.84, at East Templeton.

*Wind.*—Prevailing direction, southwest.—J. Warren Smith, Observer, Weather Bureau, Boston, director.

## NEW JERSEY.

*Temperature.*—The mean was 0.3 below the normal; maximum, 70, at Somerville, 18th; minimum, 11, at Charlotteburg, 27th; greatest monthly range, 63, at Somerville, Toms River, Millville, and Woodbine; least monthly range, 37, at Hightstown.

*Precipitation.*—The average was 0.25 below the normal; greatest monthly, 4.63, at Hightstown; least monthly, 2.19, at Atlantic City.

*Wind.*—Prevailing direction, northwest.—E. W. McGann, Observer, Weather Bureau, New Brunswick, director.

## NEW MEXICO.

*Temperature.*—Maximum, 76, at Socorro, 1st; minimum, -3, at Halls Peak and Sulphur Hot Springs, 12th; greatest monthly range, 68, at Chama; least monthly range, 40, at Santa Fe.

*Precipitation.*—Greatest monthly, 0.85, at Chama; least monthly, 0.00, at several stations.—H. B. Hersey, Observer, Weather Bureau, Santa Fe, director.

## NEW YORK.

*Temperature.*—The mean was 0.1 above the normal; maximum, 73, at Watkins, 9th and 11th; minimum, -3, at Lowville, 26th; greatest monthly range, 65, at Lowville; least monthly range, 35, at Cortland and Setauket.

*Precipitation.*—The average was 0.84 below the normal; greatest monthly, 5.59, at Eden Center; least monthly, 0.53, at Stillwater.

*Wind.*—Prevailing direction, southwest.—Prof. E. A. Fuertes, Dean of the College of Civil Engineering, Cornell University, Ithaca, director; R. M. Hardinge, Observer, Weather Bureau, assistant.

## NORTH CAROLINA.

*Temperature.*—The mean was 1.4 below the normal; maximum, 70, at Chapel Hill, 3d; minimum, 8, at Highlands, 25th; greatest monthly range, 64, at Bakersville; least monthly range, 38, at Hatteras.

*Precipitation.*—The average was 0.86 below the normal; greatest monthly, 8.32, at Hatteras; least monthly, 1.11, at Mocksville.

*Wind.*—Prevailing direction, northeast.—Dr. Herbert B. Battle, Raleigh, director; C. F. von Herrmann, Observer, Weather Bureau, assistant.

## NORTH DAKOTA.

*Temperature.*—The mean was 3.8 below the normal; maximum, 74, at Sheyenne, 9th; minimum, -27, at Gallatin, 24th; greatest monthly range, 95, at Lemert; least monthly range, 72, at Woodbridge.

*Precipitation.*—The average was 0.07 below the normal; greatest monthly, 1.50, at Woodbridge; least monthly, 0.00, at Minto.

*Wind.*—Prevailing direction, northwest.—B. H. Bronson, Observer, Weather Bureau, Bismarck, director.

## OHIO WEATHER AND CROP SERVICE.

*Temperature.*—The mean was 1.2 below the normal; maximum, 76, at Bucyrus, 9th; minimum, -2, at Auburn, 26th; greatest monthly range, 72, at Hillhouse; least monthly range, 48, at Granville.

*Precipitation.*—The average was 0.97 below the normal; greatest monthly, 4.08, at Hillhouse; least monthly, 0.71, at Milfordton.

*Wind.*—Prevailing direction, southwest.—L. N. Bonham, Columbus, director; C. M. Strong, Observer, Weather Bureau, assistant.

## OKLAHOMA.

*Temperature.*—The mean was 2.0 below the normal; maximum, 94, at Purcell, 1st; minimum, 9, at Mangum, 23d.

*Precipitation.*—The average was 1.07 below the normal; greatest monthly, 3.98, at Lehigh; least monthly, 0.10, at Mangum.

*Wind.*—Prevailing direction, north.—J. I. Widmeyer, Observer, Weather Bureau, Oklahoma City, director.

## OREGON.

*Temperature.*—The mean was 1.4 below the normal; maximum, 75, at Langlois, 18th and 14th; minimum, 5, at Crook, 18th and 22d; greatest monthly range, 57, at Crook; least monthly range, 31, at Bandon.

*Precipitation.*—The average was 2.86 above the normal; greatest monthly, 34.88, at Glenora; least monthly, 0.90, at New Bridge.

*Wind.*—Prevailing direction, south.—Hon. H. E. Hayes, Master State Grange, Portland, director; B. S. Pague, Local Forecast Official, Weather Bureau, assistant.

## PENNSYLVANIA.

*Temperature.*—The mean was 1.1 below the normal; maximum, 68, at Pittsburg, 2d; minimum, 4, at Saegerstown, 26th; greatest monthly range, 69, at Saegerstown; least monthly range, 35, at Girardville.

*Precipitation.*—The average was 0.40 below the normal; greatest monthly, 5.69, at Coatesville; least monthly, 1.16, at Somerset.

*Wind.*—Prevailing direction, west.—Under direction of the Franklin Institute, Philadelphia: W. P. Tatham, director; T. F. Townsend, Local Forecast Official, Weather Bureau, assistant.

## SOUTH CAROLINA.

*Temperature.*—Maximum, 87, at Trial, 3d; minimum, 15, at Greenville, 25th.

*Precipitation.*—Greatest monthly, 4.93, at Simpsonville; least monthly, 0.86, at Georgetown.

*Wind.*—Prevailing direction, northeast.—J. W. Bauer, Observer, Weather Bureau, Columbia, director.

## SOUTH DAKOTA.

*Temperature.*—The mean was 3.0 below the normal; maximum, 84, at Oelrichs, 4th; minimum, -24, at Webster, 24th; greatest monthly range, 104, at Webster; least monthly range, 68, at Mellette.

*Precipitation.*—The average was 0.15 below the normal; greatest monthly, 1.20, at Rosebud; least monthly, 0.02, at Faulkton.

*Wind.*—Prevailing direction, northwest.—S. W. Glenn, Local Forecast Official, Weather Bureau, Huron, director.

## TENNESSEE WEATHER AND CROP SERVICE.

*Temperature.*—The mean was 0.8 below the normal; maximum, 78, at Riddleton, 9th; minimum, 12, at Pikeville, 16th; greatest monthly range, 63, at Riddleton; least monthly range, 49, at Jacksboro.

*Precipitation.*—The average was 1.18 below the normal; greatest monthly, 4.90, at Trenton; least monthly, 1.25, at Parksville.

*Wind.*—Prevailing direction, north.—J. B. Marbury, Local Forecast Official, Weather Bureau, Nashville, director.

## TEXAS.

*Temperature.*—The mean was 1.2 below the normal; maximum, 98, at Wichita Falls, 1st; minimum, 9, at Hartley, 12th; greatest monthly range, 72, at Fort Hancock; least monthly range, 36, at Galveston.

*Precipitation.*—The average was 0.18 above the normal; greatest monthly, 10.47, at Brenham; least monthly, 0.00, at Fort Hancock and Hartley.

*Wind.*—Prevailing direction, southeast.—D. D. Bryan, Galveston, director; I. M. Cline, Local Forecast Official, Weather Bureau, assistant.

## UTAH.

*Temperature.*—Maximum, 86, at Fillmore, 7th; minimum, -16, at Scofield, 22d; greatest monthly range, 77, at Randolph; least monthly range, 47, at Lake Park.

*Precipitation.*—Greatest monthly, 1.70, at Heber; least monthly, 0.02, at Richfield.

*Wind.*—Prevailing direction, northwest.—G. N. Salisbury, Observer, Weather Bureau, Salt Lake City, director.

## VIRGINIA.

*Temperature.*—Maximum, 78, at Avon, 13th, at Petersburg and Saluda, 4th; minimum, 8, at Avon, 26th, and at Big Stone Gap, 24th and 25th; greatest monthly range, 70, at Avon; least monthly range, 45, at Cape Henry and Stephens City.

*Precipitation.*—Greatest monthly, 8.11, at Cape Charles; least monthly, 0.73, at Blacksburg.

*Wind.*—Prevailing direction, northeast.—Dr. E. A. Craighill, Lynchburg, director; J. N. Ryker, Observer, Weather Bureau, assistant.

## WEST VIRGINIA.

*Temperature.*—Maximum, 74, at Point Pleasant, 2d, and at Spencer, 5th; minimum, 3, at Marlinton, 25th; greatest monthly range, 65, at Spencer; least monthly range, 46, at Charlestown and Martinsburg.

*Precipitation.*—Greatest monthly, 4.40, at Pleasant Hill; least monthly, 0.30, at Spencer.

*Wind.*—Prevailing direction, west.—W. W. Dent, Observer, Weather Bureau, Parkersburg, director.

## WISCONSIN.

*Temperature.*—The mean was 1.0 below the normal; maximum, 79, at Prairie du Chien, 1st; minimum, -24, at Osceola; greatest monthly range, 94, at Osceola; least monthly range, 57, at Manitowoc.

*Precipitation.*—The average was 0.50 below the normal; greatest monthly, 2.35, at Sharon; least monthly, 0.65, at Hayward.

*Wind.*—Prevailing direction, northwest.—W. L. Moore, Local Forecast Official, Weather Bureau, Milwaukee, director.

## WYOMING.

*Temperature.*—Maximum, 70, at Wheatland, 9th; minimum, -17, at Sheridan, 23d; greatest monthly range, 81, at Sheridan; least monthly range, 59, at Cheyenne.

*Precipitation.*—Greatest monthly, 2.51, at Fort Yellowstone; least monthly, 0.06, at Laramie.

*Wind.*—Prevailing direction, west.—E. M. Ravenscraft, Observer, Weather Bureau, Cheyenne, director.



## OBSERVATIONS ON THE GREAT LAKES.

## REPORTS FROM VESSELS.

The Lake Marine Section of the Forecast Division has received reports for November from the captains of 29 vessels navigating the Great Lakes. The following miscellaneous items are extracted from their reports.

Capt. R. E. Gain, s. s. "W. H. Sawyer," November 5, 11 p. m., at Milwaukee, bright aurora in northeast.

Capt. Geo. Holdridge, s. s. "A. D. Thompson," reports a shoal composed of large bowlders not on the Lake Survey charts of Lake Huron, and located east-southeast of Detour light, distant 9 miles; Graveley Islet bore nearly northwest, and a double point on Drummond Island bore northeast-by-north, distant 2 miles; the shoal has 10 feet of water on it and is probably of small extent, there is a depth of 7 fathoms close by.

Capt. George Robertson, schooner "M. A. Lydon," on the 30th lay in the harbor of Charlotte, Lake Ontario, wind-bound on his way to Toronto, and says that this is the poorest port on the Lake at which to get weather information; recommends that greater conveniences be provided.

Capt. J. W. Morgan, s. s. "Australasia," November 1, while passing up the Saint Marys River, "auroras very bright and extending overhead, part of the time very red and then very faint, observed until 10.30 p. m."

Capt. Hugh O. Miller, s. s. "Conemaugh," desires the display of weather signals at Sand Beach rather than Point aux Barques, as his course takes him within 2 miles of the former, but 5 miles of the latter, otherwise he gets no weather signals between Port Huron and Thunder Bay Island.

Capt. C. W. Lockwood, s. s. "B. L. Pennington," at Toledo, on the 14th and 15th, the water in Lake Erie fell  $3\frac{1}{2}$  feet during a strong westerly gale with frequent snow squalls.

Capt. John Lowe, s. s. "Kaliyuga," November 1, in the evening, at the northern end of Lake Michigan, observed the northern lights in the east and northeast.

Capt. Edward Mooney, s. s. "Wa-Wa-Tam," November 1, in the eastern portion of Lake Superior, at 5.45 p. m., northern lights; 6.15 p. m., very brilliant from east-northeast to northwest, very red in the northwest, which color lasted twenty minutes; the aurora lasted until 11 p. m.

## REPORTS FROM U. S. LIFE-SAVING STATIONS.

Through the kind co-operation of the General Superintendent of the Life-Saving Service and the Secretary of the Treasury, the Weather Bureau has received 153 weekly transcripts of journals for the month of November from the

keepers of 39 U. S. Life-Saving stations on the Great Lakes. The following special notes by the respective keepers are extracted from these journals:

*Ludington, Mich.*—St. Peter, keeper. November 1, northern lights visible from 6 p. m. to midnight.

*Vermillion Point, Lake Superior.*—S. F. Bernier, keeper. October 31, robins and blackbirds are flying south.

*Middle Island, Lake Huron.*—Donald McKenzie, keeper. October 29, first snow of the season that lay for any length of time. November 1, a few claps of distant thunder about 8 a. m.; 8 p. m., rain showers; northern lights visible occasionally during the night and continued after midnight till the morning of the 2d.

*Osewego, Lake Ontario.*—F. W. Anderson, keeper. November 2, between 10 and 12 p. m., thunder squalls with rain and sharp lightning.

## SURFACE CURRENTS AND FOG ON THE LAKES.

Mr. N. B. Conger, Inspector, in charge of the Lake Marine Section, in his monthly report for November states that out of 2,000 bottles that have been floated in the different lakes comparatively few have, thus far, been picked up and returned. Out of 800 floated in Lake Superior during this season only 34 have, as yet, been picked up. The general results of this work as to the movements of the water will soon be presented in a special bulletin by the Chief of the Bureau.

Thirteen stations for the display of storm signals have been established at places where they will be of great benefit to the navigators.

The total losses of vessels and lives on the lakes during this season have been 53 vessels and 123 lives; aggregate tonnage 24,258 and aggregate value \$1,040,400. Nearly half of this loss was on Lake Erie. The largest single loss has been the collision on Lake Huron of the steamers Philadelphia and Albany in the fog of November 7, 10 miles from the Life-Saving station. The cause of the great number of accidents has been the prevalence of fog, due to the vapor from the warm lake surface.

## NOTES BY THE EDITOR.

## CLIMATE OF TEXAS.

## TREE GROWTH.

Col. William W. Haupt of Kyle, Hayes County, Tex. (N. 30° 0', W. 97° 50'), communicates the results of measurements made in 1859 by Mr. J. Keuchler, of Gillespie County, Tex. (N. 30° 20', W. 98° 50'), about 200 miles northwest from the Gulf coast at Indianola. These observations were originally published in the German language in a daily newspaper, the "Zeitung," of San Antonio, and if there be no serious misprints, the general value of the record will not be seriously injured.

Mr. Keuchler seems to have adopted the idea that a tree bears the history of its climatic surroundings written in itself, and that its annual rings of growth vary in size mainly with the supply of water to the roots, so that broad rings indicate wet years and thin rings that can scarcely be distinguished with the naked eye denote dry years. Great care was taken by Mr. Keuchler in the selection of trees for his measurements. He felled three post-oaks, two of which were over 130 years old; they were located upon a high isolated position so that the drought should have an early effect upon the trees, they were also sound and healthy trees. He cut a perpendicular section from each trunk near the thick end, planed its surface very smooth and then varnished it over, which made the annual ring distinctly visible. From each section he prepared a table of the relative order and position of the annual rings; upon comparing these three tables they were found to correspond exactly, thus confirming the idea that moisture is the principal cause of the difference in the breadth of the rings. Although some authors have observed in Texas two quite distinct periods of growth and repose within one year, one of them beginning with the spring and ending with the droughts of early summer the other beginning with the rains of early autumn and ending with the dry cold of winter, yet Mr. Keuchler thought it best to attribute his outermost ring to the growing season of 1858, and counted thence inward and backward, one ring for each year, obtaining the dates given in the next paragraph, which also shows the width of the respective rings, or rather his inference as to the character of the rainfall of each season.

1725-'27, very wet; 1728 and '29, dry; 1730, very wet; 1731 and '32,

dry; 1733-'38, wet; 1739-'41, dry; 1742-'57, very wet; 1758, average; 1759-'61, very dry; 1762 and '63, wet; 1764, very dry; 1765-'70, very wet; 1771-'76, extremely dry; 1777-'80, wet; 1781-'83, average; 1784-'87, wet; 1788-'90, dry; 1791, average; 1792 and '93, very wet; 1794, average; 1795-'98, very wet; 1799, very dry; 1800 and '01, very wet; 1802-'05, very wet; 1806-'11, extremely wet; 1812-'18, very wet; 1819, average; 1820, very dry; 1821-'24, very wet; 1825 and '26, average; 1827-'31, very wet; 1832, average; 1833 and '34, very dry; 1835, very wet; 1836, very wet; 1837, dry; 1838, average; 1839 and '40, very wet; 1841, dry; 1842, average; 1843 and '44, dry; 1845 and '46, very wet; 1847, dry; 1848, very wet; 1849 and '50, wet; 1851-'54, average; 1855-'58, dry.

This record of 134 years shows 6 extremely dry; 8 very dry; 19 dry; 17 average; 18 wet; 60 very wet; 6 extremely wet. The large number of very wet years, as given by Mr. Keuchler, is not at all in accord with the rainfall records during the years 1840 to 1890, and, in fact, no region on the globe is known where the distribution of the rainfall is similar to that given by these records. It is evident that the breadth of the annual rings of growth adopted by Keuchler as corresponding to dry and average and wet seasons needs considerable modification, there is no reason conceivable why the rings of average breadth should not be the most numerous, while those corresponding to the unusual extremes of dryness and wetness should be about equally numerous. The tree growth can not be adopted as an index of the rainfall alone unless it is proved by the biologist that rainfall alone affects the growth, which is well known to be far from true. The annual rings certainly depend at least in part upon the evaporation, the sunshine, the temperature, and the distribution of rain in frequent showers or in frequent heavy floods. It is the combination of several favorable meteorological circumstances that must have produced the large number of broad rings which Mr. Keuchler has attributed to 60 very wet years and 6 other extremely wet years. In fact it is best not to attempt to establish any fine details as to the climate from such a record of tree growth, but to content one's self with the general statement that there were 14 years during which the climate was unfavorable for the increase of woody fiber, 54 years during which there was an average favorability, and 66 years that produced large growth owing to very favorable conditions. As the

abundance of water accessible to the roots depends not merely upon the quantity of rainfall but still more upon the style of rain and the character of the soil, and the evaporation due to dry winds, it may be more rational to infer that during 134 years there have been 66 in which the rainfall was well conserved for the use of the tree.

#### FROSTS IN TEXAS.

Col. Haupt has kept a full record of the weather since 1857; from March, 1857, to November, 1859, his place of observation was Caney, Matagorda County, Tex. (N. 28° 50', W. 95° 40'), but from January, 1860, to the present date, it was at Kyle, Hayes County, Tex. (N. 30° 0', W. 97° 50'). From his data he furnishes the following list of frosts, which is presumed to be practically complete and therefore of value:

##### *Frosts in Matagorda County, Texas.*

1857.—March 13, killing frost; a week of cold weather. April 6, freezing (thermometer 28°), cotton and corn cut off; 11th, cold weather, hard norther set in; 13th, frost, but not serious; 23d, heavy frost, freezing, killing corn 3 to 6 feet high; 24th, frost.

1858.—November 3, slight frost; 5th, white frost; 9th, first freeze (thermometer 32°).

1859.—March 8, frost and ice; 17th, frost; 31st, frost, but too dry to do damage. April 16, frost, but no serious damage; 23d, heavy frost. October 31, light frost. November 13, everything frozen, ice one inch thick (thermometer 22°); 14th, heavy frost; 18th, frost, followed by very warm weather, with mist and sunshine till the 28th.

##### *Frosts in Hayes County, Texas.*

1860.—January, cold weather during month. February 22 and 23, frost and a little ice. March 19 and 20, frost. October 14, frost. November 24, frost, first freeze. 1861.—November 23, very light frost. 1862.—February 20, heavy frost. 1863.—January 15, frost, freezing; 16th, heavy frost, killing vegetation; 17th, frost, freezing; 28th, heavy frost and freeze. 1863.—February 4, heavy frost and freeze. October 24, frost and ice. 1864.—February 29, sleet during day; rained and froze, covering every twig with ice an inch thick. May 11, very light frost. October 5, 9, and 22, very light frost. November 20, ice 1-inch thick. December 22 and 23, heavy frost.

1865.—January 23, freezing all day. February 9, freezing and sleeting. April 22, light frost. November 2, heavy frost at Austin. 1866.—December 7, first freeze; heavy frost. 1867.—November 5, frost. 1868.—November 1, frost, with other light ones occasionally until the 16th. 1870.—November 16, light frost, first of the season; 22d, white frost; 25th, first ice. 1871.—November 19, first frost of season; 20th, sharp frost; 29th, first ice; 30th, ice and sleet. December 1, 2, and 5, ice and sleet.

1873.—October 29, first frost; 30th, sharp frost. 1877.—November 10, frost and slight freeze; 11th, heavy frost. 1879.—January 12, heavy frost. October 25, frost. November 19, frost. 1880.—March 22, freezing. 1881.—November 2, light frost. 1882.—March 9, heavy frost and ice. 1883.—November 16, frost. 1884.—November 20, heavy killing frost. December 18, heavy killing frost. 1885.—February 14, heavy frost. 1887.—February 4 and 5, sleet. November 28, first freeze. 1888.—October 23, frost. November 9 and 10, frost; 22d, first ice. 1891.—November 8, first frost. 1893.—January 19, first freeze. November 15, first frost.

#### NORTHERS IN TEXAS.

Col. Haupt also furnishes the following list of northers observed by him at Caney and Kyle:

##### *Northers in Matagorda County, Texas.*

1857.—April 11, heavy norther. May 2, heavy norther. 1859.—March 17, heavy norther. April 2, 14, and 21, norther; 22d, severe norther. May 27, cold north wind. September 4, norther; cold, requiring fires and overcoats; 19th, norther. October 17, norther in the night; 27th, norther before day. November 12, norther, with light rain, severe wind all day and following night; 13th, wind moderated in the morning; 17th, high wind from south till 11 o'clock when high, dry norther set in and calmed off at night; 28th, light norther. December 1, norther at night; 5th, norther at night, very severe by daylight; 6th and 7th, heavy wind.

##### *Northers in Hayes County, Texas.*

1860.—February 28, norther in evening. March 15, norther. April 22, norther; 28th, cold north wind; 30th, norther. May 8, norther. September 6, breeze from north; 14th, cool north wind. November 6, light norther; 22d, norther; 27th, severe cold norther; 28th, norther, still blowing. December 4, norther; 21st, norther, but clear; 28th, north wind, increasing as the day passed; 29th, north wind continued; 30th, high wind all day.

1861.—January 10, high norther; 14th, norther; 23d, cold norther, freezing at night, with continued wind; 24th, wind from north all day. April 14, heavy norther. August 1 to 4, norther lasting three or four days, followed by rain. September 25, norther during early part of the night. November 22, clear norther blew. December 12, norther began after dark and lasted forty-eight hours; 20th, light norther; 26th, norther.

1862.—January 12, brisk wind at sunset from northeast, veered to northwest; 27th, north wind and rain. February 4, last eight days wind blew first sixty hours very hard from the south balance of time from the north. 8th, 9th, 14th, and 15th, cold norther; March 18, norther. April 21, high wind; 24th, norther. September 10, norther at night. October 24, norther.

1863.—January 14, severe norther. February 4, severe norther. April 11,

norther. May 6, norther blowing, cool and clear. August 24, norther, with lightning in the north. September 17, norther. November 6, norther.

1864.—March 10 to 17, constant north wind; 24th, high wind and cold; 27th, high south wind, followed by norther. April 7 and 14, cold norther. May 27, norther at night. June 15, cool norther. August 20, norther and northeaster blowing for last 48 hours. October 1, 4, 20, and 21, norther. November 2, norther blew terrible gusts; 8th and 9th, norther blew with great violence; 17th, norther lasted forty-eight hours. December 2, mild norther in the evening; 3d, norther, blew moderately.

1865.—January 10, cold norther; 13th, norther, began at midnight; 21st, norther about 4 p. m.; 24th and 25th, north wind all day; 26th northeast wind all day; 27th, cold northeast wind all day; 28th and 31st, cool northeast wind all day. February 1, moderate east and north wind; 4th, wind northeast in the morning, northwest in the evening; 5th, wind in the north; 12th, wind northeast; 13th and 14th, light norther; 17th and 21st, strong north wind; 22d and 23d, northeast wind; 24th, northeast wind, northwest in the evening. March 9 and 10, high winds. April 19 to 21, continuous north wind. May 1 and 6, cool norther blowing from last evening; 8th, cool norther, still blowing. November 2, norther. December 12, heavy norther.

1866.—February 14, heavy norther all day; 15th, norther still high. September 19, norther.

1867.—October 4 and 5, strong wind from the north; 15th and 22d, norther; 30th, wind from the north since the 26th.

1868.—January 6 to 10, very cold norther, lasting 107 hours. March 10, sharp norther. September 16, norther, blowing quite cool; 22d, sharp norther at sunset. October 7, norther at 1 p. m. November 16, norther. December 13, norther.

1869.—February 2 to 3, norther; ice morning of 3d; 21st, east of north norther in early morning. March 24, heavy norther, blowing hard and cold all day. September 7, strong norther.

1870.—September 1, cold north wind. October 15 to 19, wind generally from the north during flood.

1871.—October 30, cool norther in the morning. December 3, cool norther.

1879.—January 11, wind from west veering to northwest at night. September 9, north wind for six days past. October 16, norther, continuing to 29th. December 19, severe norther (see frosts).

1880.—December 29, coldest wind on record.

1881.—February 10-11, cold north wind.

1882.—January 16, norther, with sleet. March 5, norther in evening.

1883.—April 21 and 22, norther. August 12-17, norther, wind from north, weather warm; 24-30th, norther, cool.

1885.—August 31, north wind for past five days. September 3, north wind for past three days.

1886.—June 19-25, cool north wind. September 23, north wind, first norther; 29th, north wind.

1887.—January 3, north wind, clear; 9th, north wind, wet; 10th, north wind, clear. August 6 and 24, north wind. September 28, first norther. October 12 and 24, north wind. November 11 and 27, north wind. December 13 and 24, north wind.

1888.—January 15, 18, and 19, north wind. February 2, 4, 10, 15, and 22, north wind. March 8 and 18, north wind. April 12, 18, and 23, north wind. May 10, 12, 28, 29, and 30, north wind. June 24 and 26, north wind. August 13, northeast wind. October 21 and 22, north wind. November 16-20, 22, 25, and 26, north wind. December 8, 25, and 29, north wind.

1889.—February 24, north wind. March 1, 22, and 31, north wind. April 3, 12, and 30, north wind. May 1, 2, 13, and 18, north wind. December 30, north wind.

1890.—April 2, 16, and 19, north wind. June 6 and 7, north wind. September 19, 22, 24, 25, and 26, north wind. October 12, north wind. November 11 and 16, north wind. December 6 and 8, north wind.

1891.—May 25-27, north wind. June 6, 16, and 29, north wind. August 1 and 29, north wind.

1892.—May 21 and 22, north wind. August 1, 14, 15, and 24, north wind. September 7, first norther; 11th, second norther.

1893.—May 7 and 8, north wind. August 1 and 30, north wind. September 5, 9, 10, and 11, north wind. November 12-14, north wind.

#### THE EARTHQUAKE OF NOVEMBER 27TH.

Although earthquakes have little to do directly with meteorology, yet the students of geology need for their study as many observations as possible of the exact time and nature of even the slightest earthquake tremor. In order to assist in the study of this subject, the Weather Bureau has always indorsed the policy adopted by meteorologists throughout the world of encouraging its observers to observe and record this earthquake phenomena. Those who desire to add somewhat to the accuracy of the records should make use of some one of the many forms of the seismoscope, such as the simple ones described in the Annual Report of the Chief Signal Officer, 1875, p. 847, or the more sensitive form perfected by Profs. Gray, Mendenhall, Marvin, and others, and recommended by the Geological Survey (see also the apparatus described in the article "Earthquake" in the American Cyclopaedia, published by the Appletons). Those who have no instruments, and not even an exact time-piece, should pay especial attention to the frequency and the number of the several slight tremors that usually accompany the main shock; they should notice the apparent direction of movement of buildings and the ground at as many places as possible in the neighborhood, since the movement often varies



very much on the opposite sides of a hill or valley. In describing the results of such observations, observers should omit references to their theories as to the nature and origin of an earthquake shock unless, indeed, they collect observations especially adapted to test definite theoretical hypotheses.

Numerous reports have been received of an earthquake shock on November 27, which was felt between 11.42 a. m. and noon of that date, throughout northern New England and eastern Canada. A special description of this earthquake will be found in the November Bulletin of the New England Weather Service.

In connection with this earthquake, the Editor would remark that although the center of this disturbed area was probably not far from Quebec, yet it is by no means necessary to conclude that there is a region extending from 50 to 100 miles northeast of Quebec in which an almost extinct volcano is slowly expiring. An earthquake has, in fact, no necessary connection with a volcano; volcanic eruptions produce slight earth tremors in their neighborhood, but earth tremors and severer earthquakes occur without depending upon volcanic eruptions. It is more plausible that the dislocation of strata attending an earthquake may produce vents through which volcanic eruptions subsequently take place. We must consider the surface of the earth to a depth of at least 50 miles as being in a state of strain. This strain is produced by numerous causes, among which may be mentioned, first, the contraction of the solid crust due to cooling; second, the expansion due to the slow crystallization of sedimentary strata as they are converted into crystalline rock; third, the pressures involved in the evolution of steam and other gases; fourth, the strain produced by the upward pressure of liquid lava forced up through cracks in the lowest strata and seeking to break through the upper strata; fifth, the strains produced by the weight of the ocean on its bed, or of mountains on their bases; finally, the enormous strains produced by the differential attractions of the sun and moon on various portions of the revolving earth and the strains due to the centrifugal force of that revolution.

Of all these causes, the centrifugal and tidal forces are, at the present time, probably most effective in producing the gradual uplifting of continents and mountain chains. A large majority of the earthquake tremors and shocks are due to the actual giving way of the geological strata under these immense strains; sometimes a set of inclined strata slide over each other a few inches, at other times a compressed stratum cracks and one portion is shoved up higher than the other by a few inches, forming the "faults" that one sees everywhere in the rocks. In this way, apparently, the great geological anticlines and synclines were formed; the range of the Rocky Mountains and the Andes represents a general rise, step by step, during many ages, and which is even now going on, while the other western portion of the stratum has not been elevated and underlies the Pacific Ocean. If lava and volcanoes burst up along the line of such a cleft in the rocks we must attribute the possibility of volcanoes to the occurrence of earthquakes and not *vice versa*. There are probably very few cases in which volcanoes should be spoken of as the ultimate cause of earthquakes.

There are numerous regions in the United States within which earthquake tremors are very frequent, and such frequency may plausibly be considered as indicating one of two alternatives, viz., either the strains are particularly frequent and severe in those regions, or else the geological strata thereabouts are strained in such a manner as to render it particularly easy for them to give way suddenly and become slightly dislocated so as to form new cracks and "faults." When these earthquake areas occur in hilly or mountainous countries, we conclude that the mountains are but the present results of a similar set of dislocations that have been going on through several geological ages; when an earthquake area is confined mainly to a river valley we connect it with the arrangement of strata that made that valley a possibility. But without adopting any hypothesis as to the origin of special earthquake

regions we must, for the present, and as observers merely, be content to collect the observations for the use of the geologists.

### RELATIVE INTENSITY OF WEST INDIAN STORMS.

By Prof. H. A. HAZEN.

In the following table the column on the left gives the year and those on the right give for each year and month two horizontal rows of figures, D and I; in the upper horizontal row (D) is given the date of the beginning of the storm, as far as reports are at hand, and in the lower row (I) is a figure indicating relative intensity.

This table has been prepared by Prof. Hazen in connection with his study of the storms of the western portion of the Gulf of Mexico; it comprises all the storms of which mention has been made in the MONTHLY WEATHER REVIEW or in the "Monthly Summary of International Observations," as originating east of the 100th meridian and south of the 30th parallel.

The date of the origin is taken as the day when the first, increasing, or violent winds, are noted. The scale of intensity is relative and depends in part upon the violence of the wind and in part on the extent of the storm.

Storms in the neighborhood of the West Indies during August, September, and October, from 1874 to 1893.

	August.			September.			October.		
1874, D....	2	8	25	3	1	3	13	2	2
I....	1	6	13	3	1	3	13	2	2
1875, D....	1	1	1	3	1	3	13	2	2
I....	1	1	1	3	1	3	13	2	2
1876, D....	12	1	1	12	1	1	19	1	1
I....	12	1	1	12	1	1	19	1	1
1877, D....	14	17	21	14	17	21	16	24	24
I....	14	17	21	14	17	21	16	24	24
1878, D....	12	24	29	12	24	29	9	13	18
I....	2	1	1	3	1	2	2	1	3
1879, D....	13	16	30	8	12	12	3	10	25
I....	13	16	30	8	12	12	3	10	25
1880, D....	5	12	15	7	1	1	1	5	7
I....	5	12	15	7	1	1	1	5	7
1881, D....	1	16	22	9	14	14	1	2	2
I....	1	16	22	9	14	14	1	2	2
1882, D....	29	1	1	3	22	22	6	1	1
I....	29	1	1	3	22	22	6	1	1
1883, D....	15	23	23	4	1	1	8	22	22
I....	15	23	23	4	1	1	8	22	22
1884, D....	3	10	10	3	10	10	7	11	21
I....	3	10	10	3	10	10	7	11	21
1885, D....	23	30	30	15	18	24	10	2	1
I....	23	30	30	15	18	24	10	2	1
1886, D....	6	13	15	22	24	24	1	7	22
I....	6	13	15	22	24	24	1	7	22
1887, D....	5	15	19	11	15	24	6	8	9
I....	5	15	19	11	15	24	6	8	9
1888, D....	16	31	31	7	24	24	10	24	24
I....	16	31	31	7	24	24	10	24	24
1889, D....	8	20	25	1	4	13	1	4	1
I....	8	20	25	1	4	13	1	4	1
1890, D....	11	23	27	3	1	3	2	22	22
I....	11	23	27	3	1	3	2	22	22
1891, D....	18	26	3	6	11	14	1	6	13
I....	18	26	3	6	11	14	1	6	13
1892, D....	10	1	1	11	1	1	1	3	22
I....	10	1	1	11	1	1	1	3	22
1893, D....	15	20	22	1	5	5	1	21	1
I....	15	20	22	1	5	5	1	21	1

### METEOROLOGICAL TABLES.

Meteorological record of voluntary and other co-operating observers, November, 1893.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
Alabama.	o	o	o	Ins.	Alabama—Cont'd.	o	o	o	Ins.
Alco.....	79	37	55.7	4.15	Geneva.....	83	27	55.8	3.02
Bermuda.....	78	30	53.0	2.13	Greensboro.....	80	25	54.3	3.22
Birmingham.....	78	33	50.2	4.87	Healing Springs.....	80	25	55.1	5.20
Brewton.....	85	25	55.5	2.90	Highland Home.....	76	27	55.9	3.16
Carrollton.....	74	22	51.7	2.03	Livingstone.....	79	22	53.4	2.98
Chepultepec.....	77	15	48.7	2.03	Lynna.....	86	16	52.8	2.60
Citronelle.....	77	32	57.4	2.88	Maple Grove.....	86	16	52.8	2.73
Claiborne Landing.....	77	32	57.4	2.88	Marion.....	76	26	55.5	1.91
Cordova.....	76	15	47.6	1.39	Mount Willing.....	77	28	56.6	3.15
Decatur.....	76	30	55.4	3.28	Newbern.....	77	26	55.2	3.37
Elba.....	70	30	55.4	3.02	Newburg.....	79	16	49.4	2.10
Eufrasia.....	84	29	58.8	2.32	Newton.....	80	28	56.0	2.87
Evangelina.....	80	28	55.8	2.31	Opelika.....	76	24	54.6	1.08
Florence.....	77	20	49.7	1.95	Oxanna.....	75	22	52.1	1.37
Florence.....	77	20	49.7	1.95	Pine Apple.....	78	22	53.8	3.26
Fort Deposit.....	79	26	54.2	1.70	Pushmataha.....	76	29	55.0	4.50
Gadsden.....	76	21	50.9	1.70	Rock Mills.....	74	20	49.4	1.64
					Scottsboro.....	74	20	49.4	1.64

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
Alabama—Cont'd.	o	o	o	Ins.	Arizona.	o	o	o	Ins.
Selma.....	78	28	54.7	2.81	Antelope Valley.....	80	36	53.1	1.71
Starlington.....	78	28	54.7	2.81	Arizola.....	80	36	53.1	0.50
Sturdevant.....	77	23	52.5	1.06	Ariz. Canal Co. Dam.....	87	42	64.4	0.46
Talladega.....	77	23	52.5	1.06	Benson.....	80	30	54.0	0.00
Talladega Falls.....	77	23	52.5	1.06	Buckeye.....	89	33	59.3	1.60
Thomasville.....	80	24	55.2	2.88	Calabasas.....	77	28	49.2	0.35
Tuscaloosa.....	73	20	49.5	2.35	Casa Grande.....	89	35	60.3	0.00
Tuscumbia.....	73	20	49.5	2.35	Crittenden.....	83	19	49.9	0.49
Union Springs.....	76	25	54.5	2.71	Dragon Summit.....	78	33	58.4	0.00
Uniontown.....	78	28	56.7	3.10	Dudleyville.....	81	32	53.5	1.10
Valley Head.....	76	16	48.8	1.95	Farley's Camp.....	71	43	57.8	1.50
Warrior.....	76	16	48.8	1.95	Flagstaff.....	70	11	41.4	1.70
Wilsonville.....	76	16	48.8	1.95	Florence.....	84	37	56.6	0.43
					Fort Apache.....	70	20	43.6	0.28
					Fort Bowie.....	77	29	52.0	0.07
					Fort Grant.....	77	24	51.4	0.40
					Fort Huachuca.....	78	24	49.9	0.37
					Fort Mohave.....	84	39	56.7	0.28
					Gila Bend.....	78	35	53.2	1.25

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
Arizona—Cont'd.					California—Cont'd.				
Holbrook	74	16	43.3	0.30	Ciaco	58	14	36.3	0.05
Maricopa	90	35	59.2	0.30	Citrus	72	31	51.5	0.05
Mount Huachuca	75	24	49.7	0.25	Claremont	79	31	55.6	1.31
Natural Bridge	75	29	50.1	0.75	Cloverdale	75	38	57.7	6.64
Oracle	75	29	50.1	0.75	Colegrove	82	32	50.4	9.32
Oro	83	33	56.9	0.00	Colfax	85	34	57.7	0.23
Pantano	77	19	49.8	1.00	Colton	80	28	53.4	1.13
Parker	77	19	49.8	1.00	Colusa	80	28	53.4	1.13
Payson	77	19	49.8	1.00	Corning	76	37	56.5	2.60
Peoria	78	38	56.2	0.00	Crescent City	76	37	56.5	2.60
Phoenix	84	38	53.4	0.00	Crescent City L. H.	76	37	56.5	2.60
Red Rock	78	34	54.0	0.50	Crofton	76	37	56.5	2.60
Reymert	78	34	54.0	0.50	Davisville	75	35	55.7	2.97
Rye	80	30	52.2	1.52	Davisville	75	35	55.7	2.97
St. Helena R'h	80	30	52.2	1.52	Delano	74	30	50.5	0.85
San Carlos	86	23	50.0	0.34	Delta	70	25	50.2	8.05
San Simon	91	32	57.0	0.00	Dinuba	73	33	50.7	0.47
Show Low	79	33	53.8	1.52	Downey	92	40	60.3	0.47
Signal	79	33	53.8	1.52	Dry Creek	78	32	52.5	4.07
Tevison	85	39	59.3	0.00	Drytown	87	40	59.8	0.37
Texas Hill	84	33	55.1	0.40	Duarte	76	32	51.4	1.60
Tucson	85	32	55.4	0.36	Dunnigan	66	22	44.0	11.35
Tucson	70	24	45.6	0.00	Dunsmuir	53	17	41.0	0.60
Walnut Ranch	73	24	45.6	0.00	East Brother L. H.	65	20	40.0	9.46
Whipple Barracks	73	24	45.6	0.00	Edmonton	76	37	53.6	4.50
Willcox	73	24	45.6	0.00	El Dorado	77	30	53.3	3.02
Yuma	98	40	70.4	0.30	Elmira	77	30	53.3	3.02
Arkansas.					El Verano	74	31	52.4	6.87
Arkadelphia	81	20	49.7	4.79	Emigrant Gap	80	21	46.0	5.95
Arkansas City	75	20	49.9	3.10	Esparto	59	30	53.3	2.05
Ashdown	81	20	49.7	4.79	Evergreen	78	30	53.8	0.16
Branch	75	20	49.9	3.10	Exeter	85	37	52.8	1.46
Blanchard Springs	81	23	51.0	7.13	Fall Brook	74	30	53.4	2.19
Brinkley	78	24	47.6	4.66	Farmington	86	28	59.0	4.15
Camden	82	26	47.5	6.63	Felton	78	35	55.6	0.00
Camden	82	26	47.5	6.63	Fernando	78	35	55.6	0.00
Conway	74	24	46.9	2.37	Florida	83	40	60.5	0.00
Corning	72	16	44.8	2.55	Florin	73	30	50.2	2.03
Dallas	70	25	47.2	4.22	Folsom	75	35	53.6	4.22
Dardanelle	73	14	45.6	2.91	Folsom City	72	35	53.6	3.94
Payetteville	81	24	53.0	3.31	Fort Rose	77	32	52.8	6.05
Forrest	73	14	45.6	2.91	French Corral	77	32	52.8	6.05
Fulton	73	14	45.6	2.91	Fresno	69	30	57.0	0.13
Gaines Landing	82	21	52.0	6.50	Fruto	75	38	56.7	2.80
Hamburg	82	21	52.0	6.50	Galt	73	33	54.5	3.52
Helena	76	20	50.7	4.71	Georgetown	70	29	48.8	10.94
Helena	76	20	50.7	4.71	Gilroy	76	30	53.9	0.72
Hot Springs	78	19	51.0	4.48	Girard	62	33	46.1	0.72
Keenes Ferry	79	10	45.6	2.51	Glen Ellen	70	29	53.2	0.20
Kirby	77	23	51.0	4.90	Gorman Station	72	27	55.2	1.00
Lonoke	76	24	51.1	4.50	Grass Valley	72	27	55.2	1.00
Malvern	75	18	47.9	5.10	Gridley	72	22	46.9	4.41
Mount Nebo	78	19	46.4	3.14	Headlands	70	36	53.0	3.83
New Gascony	68	22	49.3	3.18	Hendersons Rch	78	30	50.0	5.50
Newport	78	32	49.4	3.24	Hollister	81	32	54.2	0.00
Newport	78	32	49.4	3.24	Hornbrook	64	22	42.1	4.17
Osceola	82	21	48.8	4.77	Humboldt L. H.	75	49	62.0	0.05
Oscar	76	23	49.2	2.90	Huron	75	49	62.0	0.05
Pine Bluff	80	33	52.6	3.18	Hyde Ranch	68	23	50.3	7.22
Prescott	78	30	52.8	4.86	Independence	72	22	46.9	4.41
Rison	84	19	53.6	5.73	Indio	70	26	53.7	3.14
Russellville	75	22	48.8	3.60	Iono	70	26	53.7	3.14
Searcy	75	19	45.0	6.14	Iono	70	26	53.7	3.14
Stuttart	80	20	49.5	4.48	Iowa Hill	78	33	51.1	8.30
Tarkenton	80	25	53.6	5.33	Jackson	64	32	48.3	5.28
Washington	78	23	50.0	4.80	Julian	71	19	47.1	3.23
Wicks	63	10	41.4	2.60	Keeler	72	27	49.8	0.18
Wislow	63	10	41.4	2.60	Keene	68	24	46.7	4.68
California.					Kelseyville	73	28	50.6	4.68
Agnew	80	35	56.1	0.90	Kennedy Gold	70	33	50.3	5.98
Anaheim	80	45	58.8	0.30	King City	80	22	52.1	0.18
Anderson	77	20	49.8	6.30	Kingsburg	78	30	53.6	0.15
Antioch	73	37	54.5	2.18	Knights Landing	78	32	56.5	1.77
Aptos	73	35	54.5	3.16	Kono Tave	72	40	53.2	3.70
Arcata	63	29	49.4	11.90	Lagrange	72	34	55.0	1.70
Arlington Heights	80	32	55.6	0.28	Lathrop	72	34	55.0	1.70
Athlone	80	34	57.9	0.45	Laurel	72	34	55.0	1.70
Auburn	78	39	57.0	5.32	Lemoore	82	34	53.6	3.27
Bakersfield	78	33	55.7	0.30	Lick Observatory	67	26	46.9	4.01
Bakersfield	78	33	55.7	0.30	Lime Point L. H.	79	30	54.3	1.59
Ballast Point L. H.	78	33	55.7	0.30	Livermore	79	30	54.3	1.59
Barstow	73	28	52.4	0.02	Livingston	78	40	58.3	0.75
Bear Valley Dam	80	30	56.6	0.00	Lodi	70	30	52.8	3.11
Beaumont	80	30	56.6	0.00	Long Beach	80	35	54.6	0.10
Belmont	80	45	58.3	0.30	Los Angeles	68	34	55.0	0.13
Berendo	73	34	53.3	0.30	Los Banos	80	40	54.9	0.30
Berkeley	70	42	54.3	5.22	Los Gatos	80	40	54.9	0.30
Bishop Creek	72	25	48.8	0.10	Los Gatos	80	40	54.9	0.30
Boca	78	10	46.0	2.42	Mammoth Lake	74	34	54.0	1.08
Borden	78	28	52.9	0.00	Mare Island L. H.	85	39	60.1	0.35
Boulder Creek	74	24	50.3	3.60	Mariposa	74	28	49.2	2.03
Brentwood	70	32	51.4	2.08	Marysville	70	30	51.9	2.82
Brighton	80	40	58.8	3.95	Merced	72	33	54.1	1.51
Byron	79	30	52.5	1.50	Middleton	72	33	54.1	1.51
Caliente	70	40	53.3	0.20	Milton (near)	70	35	54.8	1.94
Calistoga	78	33	56.7	6.93	Modesto	80	43	61.1	1.06
Campo Seco	78	33	56.7	6.93					
C. Mendocino L. H.	78	34	56.4	0.00					
Capitola	78	32	53.3	1.09					
Castroville	80	32	57.1	2.44					
Centerville	85	32	52.8	3.53					
Chico	81	36	53.0	0.61					
Chino	81	36	53.0	0.61					

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
California—Cont'd.	°	°	°	Ins.	California—Cont'd.	°	°	°	Ins.
Mohave	70	38	52.4	0.15	Shasta Springs †	65	21	43.8	10.03
Mokelumne Hill	73	39	49.9	5.04	Shingle Springs	67	32	49.4	4.98
Monson	73	30	51.4	0.22	Sisson	59	21	41.3	4.25
Montague	71	20	46.3	3.05	Soledad	80	30	53.9	0.17
Monterey	76	28	54.8	0.00	Sonoma	74	32	49.8	5.30
Monterey (Hotel del Monte)	74	38	54.7	0.00	South Vallejo	68	27	53.8	2.19
Mount Glenwood	72	40	57.0	2.80	Spadra	83	36	56.4	0.00
Napa City	76	30	51.8	4.56	Stockton	68	30	53.0	2.38
Napa City	74	36	53.4	4.03	Stockton	79	33	56.7	2.46
National City †	84	39	57.5	0.84	Suisun City	73	33	55.4	2.76
Needles	79	41	57.8	1.30	Summit	55	12	35.4	0.00
Nevada City †	69	25	45.9	7.78	Susanville	58	19	41.4	1.80
New Almaden	76	30	55.7	0.59	Sutter Creek	67	27	46.3	3.63
Newark	84	36	58.1	2.09	Tehachapi	65	25	44.1	0.50
Newcastle	70	34	52.0	4.82	Tehachapi	72	22	45.0	0.39
Newcastle	69	31	51.6	2.30	Tehama	82	35	62.6	1.55
Newhall	83	29	53.7	0.00	Templeton	76	20	50.0	0.14
Newman	72	40	55.6	0.39	Towles	71	30	47.7	10.63
Niles	78	36	53.9	2.45	Tracy	70	28	54.8	0.87
Nordhoff	84	25	53.9	0.00	Traver	70	44	57.4	0.00
Norwalk	82	40	58.0	0.30	Trinidad L. H.	70	44	57.4	0.00
Oakdale	74	24	48.3	1.45	Tropico	80	40	57.0	0.07
Oakland	70	28	53.9	5.70	Truckee	62	12	37.2	3.96
Oakland	71	28	50.5	4.91	Tulare	66	30	49.9	0.00
Ogilby	82	44	63.6	0.27	Tulare	84	24	55.0	0.50
Oleta	67	29	47.6	4.53	Tulare	75	34	57.0	0.60
Ontario	84	42	58.4	1.12	Turlock	69	19	46.3	0.80
Ontario	85	33	55.5	1.00	Turlock	70	24	49.6	8.81
Orland	80	31	57.2	1.97	Upper Mattole	78	29	54.6	14.93
Oroville	80	46	60.0	4.03	Vacaville	76	34	55.4	3.79
Oroville	80	36	56.2	4.03	Vacaville	76	34	55.8	3.75
Pajaro	83	36	55.9	1.56	Valley Springs	75	37	55.9	3.11
Palermo †	73	28	51.1	2.58	Ventura †	83	38	57.0	0.25
Palm Springs	85	45	63.1	3.00	Vina	74	37	55.3	1.99
Pasadena †	79	35	54.5	0.18	Volcano Springs	90	40	62.4	0.30
Paso Robles	70	20	48.7	0.00	Walnut Creek	79	34	54.2	2.50
Petaluma	79	31	53.9	3.75	Weinrich Ranch	70	44	57.4	0.07
Piedras Blancas L.H.	70	31	53.9	3.75	West Butte	68	30	50.0	1.12
Pigeon Point L. H.	70	31	53.9	3.75	Westley	77	31	57.3	0.64
Piedra Blanca L.H.	76	28	49.9	6.19	Wheatland	70	31	53.5	2.82
Placerville	67	23	45.3	5.74	Whittier	82	45	62.1	0.60
Placerville	82	26	54.2	1.20	Williams	82	30	54.8	1.02
Pleasanton	74	23	51.2	1.28	Willows	82	29	50.8	2.22
Pleasanton	74	23	51.2	1.28	Willows	80	35	54.4	2.40
Pt. Ano Nuevo L. H.	70	31	53.9	3.75	Winchester †	83	29	54.4	0.87
Point Arena L. H.	70	31	53.9	3.75	Winters	75	32	56.6	2.03
Point Bonita L. H.	70	31	53.9	3.75	Wire Bridge	69	29	50.8	5.09
Pt. Conception L.H.	70	31	53.9	3.75	Woodland	72	31	52.8	1.71
Point Fermin L. H.	70	31	53.9	3.75	Yerba Buena L. H.	70	31	53.9	3.75
Point George L. H.	70	31	53.9	3.75	Yreka †	64	20	42.0	7.83
Point Lobos	70	44	53.6	3.59	Yuba City	65	40	54.6	2.49
Point Loma L. H.	70	31	53.9	3.75	Colorado.				
Point Montara L. H.	70	31	53.9	3.75	Abbot	70	31	53.9	3.75
Point Pinos L. H.	70	31	53.9	3.75	Akron †	68	4	37.2	0.05
Point Reyes L. H.	70	31	53.9	3.75	Alma †	51	— 5	24.1	1.02
Point Sur L. H.	70	31	53.9	3.75	Arboles	70	31	53.9	3.75
Pomona	80	34	56.9	0.80	Avoca	66	— 1	38.0	0.80
Pomona (near)	70	31	53.9	3.75	Boulder †	66	— 1	38.0	0.80
Porterville	76	31	54.4	0.07	Breckenridge †	63	— 20	22.2	4.27
Port Los Angeles	70	44	58.3	0.11	Brush †	73	— 7	35.9	0.21
Poway	82	35	48.5	1.36	Byers	70	12	39.8	0.80
Puente	82	42	58.5	0.00	Canyon †	75	8	41.6	T.
Ravenna	76	29	52.8	0.00	Castle Rock †	69	0	34.2	1.00
Red Bluff	82	34	51.4	3.50	Cheyenne Wells †	71	17	35.8	0.30
Redding	78	36	55.1	7.60	Climax	40	— 6	14.9	6.45
Redding	79	32	52.8	8.33	Colbran	70	31	53.9	3.75
Redlands	74	37	55.1	0.05	Come (near) †	51	— 2	25.0	0.97
Represa	70	35	54.5	3.81	Copo	73	0	37.2	0.70
Rio Vista	74	30	54.6	2.66	Deer Trail	65	8	38.5	0.40
Riverside	82	32	53.7	0.48	Delta †	68	14	36.4	T.
Rocklin	76	40	57.6	2.89	Divide Ex. Station.	62	— 1	31.7	0.57
Roe Island L. H.	70	31	53.9	3.75	Downing †	75	5	41.0	0.26
Sacramento	62	24	46.4	3.30	Dumont	60	3	33.8	1.50
Sacramento	77	35	55.1	2.83	East Dale	70	31	53.9	3.75
Sacramento	67	36	53.6	2.83	First View	72	— 13	38.6	0.05
Salinas	70	39	56.9	0.63	Port Collins †	71	— 13	33.6	0.50
Salton	93	49	70.7	0.71	Glen Eyrie †	63	5	37.1	0.77
San Ardo	79	30	49.2	0.21	Glenwood Spgs †	67	15	37.8	1.99
San Ardo	83	26	55.8	0.30	Gold Hill	63	7	35.2	2.33
San Bernardino	78	34	54.0	0.30	Grand Junction †	62	17	37.5	0.92
San Gabriel	84	41	56.6	0.05	Greely †	66	— 1	36.9	0.31
Sanger Junction	76	27	52.0	0.00	Hannison †	50	— 5	22.9	0.50
San Jacinto	81	30	53.4	0.80	Hugo	67	6	34.2	0.50
San Jose	77	37	55.5	0.81	Husted †	71	— 1	30.5	0.29
San Jose	70	27	51.8	0.80	Idaho Springs †	66	— 3	27.5	0.74
San Luis L. H.	70	31	53.9	3.75	Julesburg †	74	— 1	34.5	0.11
San Luis Obispo	70	31	53.9	3.75	Kirk	70	31	53.9	3.75
San Mateo	69	38	55.3	2.74	Kitt Carson	76	20	47.6	0.00
San Miguel	73	30	50.4	0.30	La Jara	64	5	34.8	0.29
San Pedro	80	43	59.7	0.23	Lamar †	80	9	40.8	T.
Santa Ana	85	42	60.4	0.41	La Porte	70	31	53.9	3.75
Santa Barbara	82	40	57.4	0.07	Las Animas †	73	6	37.1	T.
Santa Barbara	80	44	58.7	T.	Lavender †	61	0	31.1	6.50
Santa Barbara L. H.	70	31	53.9	3.75	Lay †	58	— 21	26.6	1.41
Santa Clara	73	32	55.3	0.83	Le Roy †	68	5	35.3	0.48
Santa Clara	73	42	54.5	3.52	Lesslie	70	31	53.9	3.75
Santa Cruz	79	34	56.0	4.40	Loveland	70	31	53.9	3.75
Santa Cruz L. H.	70	31	53.9	3.75	McCoy †	70	31	53.9	3.75
Santa Margarita	77	20	51.0	0.00	Middle Box Elder	70	31	53.9	3.75
Santa Maria	83	35	53.0	0.22	Minneapolis †	82	9	42.6	0.31
Santa Monica	78	39	55.5	0.30	Monte Vista	60	— 2	26.8	0.40
Santa Paula	80	30	57.6	0.00	Moraine †	54	1	31.8	1.03
Santa Rosa	79	32	56.9	4.82	Pagoda (near) †	61	— 12	30.2	1.40
Satcity †	70	31	53.9	3.75	Panama †	70	31	53.9	3.75
Selma	78	30	53.0	0.01					



Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<b>Colorado—Cont'd.</b>	o	o	o	Ins.	<b>Georgia—Cont'd.</b>	o	o	o	Ins.
Parachute f.....	64	10	34.6	0.65	Cordele f.....	82	22	55.2	1.01
Red Cliff.....	70	10	34.6	0.70	Covington.....	78	19	52.1	1.30
River Bend.....	70	10	34.6	0.70	Dalhousie f.....	78	18	50.1	1.87
Rocky Ford f.....	77	5	38.4	1.	Darien f.....	85	41	64.2	1.33
Saint Cloud.....	.....	.....	.....	0.45	Dublin f.....	77	4	40.6	0.63
Sanborn.....	.....	.....	.....	1.	Eastman f.....	77	24	52.6	0.96
San Luis f.....	61	3	33.1	0.10	Elberton f.....	79	23	51.6	1.59
Seissors.....	.....	.....	.....	1.20	Fleming f.....	80	24	56.2	0.04
Seibert f.....	.....	.....	.....	0.14	Forsyth f.....	84	26	57.6	1.54
Smoky Hill Mine f.....	67	3	35.0	2.70	Fort Gaines f.....	78	26	55.8	2.34
Stamford f.....	60	0	28.8	1.15	Gainesville f.....	71	30	49.9	2.60
Steamboat Spring f.....	60	0	32.3	0.75	Gilleville f.....	75	28	51.1	1.29
Sunnyside.....	58	4	26.7	3.21	Graham f.....	74	20	45.3	0.81
Surface Creek f.....	58	5	35.4	0.92	Hawkinsville f.....	87	21	53.2	0.81
Thon f.....	72	2	35.6	0.07	Hephzibah f.....	76	30	52.6	1.80
T. S. Ranch f.....	64	11	37.3	0.65	Homerville f.....	82	28	58.3	2.22
Twin Lakes.....	.....	.....	.....	1.10	Lafayette f.....	77	19	49.4	1.63
Walden f.....	.....	.....	.....	0.40	Lagrange f.....	77	22	52.9	0.14
Ward District.....	.....	.....	.....	2.94	Lawrenceville f.....	77	17	46.9	2.02
Watkins f.....	72	12	40.3	.....	Lumpkin f.....	76	24	55.2	0.99
Wilke f.....	.....	.....	.....	0.30	Macon f.....	81	30	55.8	1.21
Yuma.....	.....	.....	.....	0.41	Marietta f.....	74	19	48.6	1.92
Zuck.....	.....	.....	.....	0.08	Marshallville f.....	79	22	56.4	1.29
<b>Connecticut.</b>	.....	.....	.....	.....	Milledgeville f.....	78	24	55.4	1.25
Bridgeport f.....	58	22	42.0	3.18	Millen f.....	83	22	54.9	2.50
Canton.....	63	12	41.0	2.71	Morgan f.....	81	26	54.8	0.90
Colchester.....	62	16	39.8	3.40	Mount Vernon f.....	75	18	51.0	1.89
Falls Village.....	.....	.....	.....	1.84	Newnan f.....	81	30	59.3	1.87
Greenfield Hill.....	.....	.....	.....	3.02	Piscataway f.....	70	22	50.3	1.40
Hartford b.....	.....	.....	.....	2.46	Point Peter f.....	70	22	50.3	1.99
Hartford c.....	60	17	40.4	.....	Poultney f.....	83	23	58.4	1.62
Lake Konomoc.....	.....	.....	.....	3.29	Quitman f.....	82	28	58.2	1.54
Lebanon.....	.....	.....	.....	3.47	Resaca f.....	76	22	49.1	1.87
Middletown.....	63	14	39.9	3.18	Reynolds f.....	76	22	49.1	1.72
New Hartford a f.....	62	12	39.1	2.36	Rome f.....	76	22	49.1	1.72
New Hartford b.....	.....	.....	.....	3.36	Talbotton f.....	84	29	58.4	3.06
North Franklin.....	62	12	38.1	2.40	Thomasville f.....	74	20	54.9	1.11
N. Grosvenor Dale f.....	59	17	39.0	3.24	Tooea f.....	76	22	51.0	1.20
Norwalk.....	.....	.....	.....	2.51	Union Point f.....	75	24	52.6	1.04
South Manchester.....	.....	.....	.....	3.55	Washington f.....	78	29	58.6	1.67
Storrs.....	62	14	38.2	2.45	Way Cross f.....	79	24	53.2	2.50
Thompson f.....	60	15	37.3	.....	Waynesboro f.....	79	24	53.2	2.08
Voluntown f.....	64	12	39.5	3.75	West Point f.....	74	23	54.6	1.61
Wallingford f.....	.....	.....	.....	2.94	Whitesburg f.....	.....	.....	.....	.....
West Simsbury.....	60	15	40.7	2.49	<b>Idaho.</b>	.....	.....	.....	.....
<b>Delaware.</b>	.....	.....	.....	2.43	Boise Barracks.....	62	16	37.6	3.14
Dover f.....	65	22	43.8	2.89	Fort Lemhi.....	60	4	30.6	0.47
Kirkwood f.....	62	.....	42.2	.....	Fort Sherman.....	54	12	34.2	7.00
Milford.....	69	21	44.9	3.48	Grangeville.....	55	12	35.3	2.19
Millboro f.....	71	18	44.5	3.41	Kootenai f.....	55	12	35.3	9.48
Seaford f.....	70	20	44.8	3.15	Lake f.....	48	2	28.9	2.45
<b>District of Columbia.</b>	.....	.....	.....	.....	Martin f.....	68	3	28.5	1.33
Dist'ing Reserv'r.....	64	20	43.3	4.00	Murray f.....	55	4	29.0	7.28
Rec'ing Reserv'r.....	64	20	43.2	4.20	Oakley f.....	66	9	35.0	0.28
West Washington f.....	68	20	44.6	4.39	Paris f.....	66	9	33.6	2.12
<b>Florida.</b>	.....	.....	.....	.....	Payette f.....	63	10	36.6	2.33
Amelia f.....	74	34	60.1	2.00	<b>Illinois.</b>	.....	.....	.....	.....
Archer f.....	88	34	66.2	4.38	Atwood f.....	76	4	34.2	3.98
Avon Park f.....	83	48	68.4	2.58	Aurora f.....	72	1	33.3	2.99
Brooksville f.....	81	38	64.0	2.67	Beardstown f.....	71	7	38.3	1.93
Clermont f.....	85	43	65.2	2.48	Bloomington f.....	68	8	36.9	1.87
De Land.....	82	38	65.8	.....	Braidwood f.....	75	6	38.5	1.92
Eustis f.....	87	38	63.8	3.13	Bushnell f.....	75	6	38.5	1.92
Federal Point f.....	80	37	63.3	3.16	Carlville f.....	73	8	41.0	1.37
Fort Meade f.....	85	41	66.8	2.67	Carlyle.....	.....	.....	.....	.....
Gainesville f.....	80	35	61.0	7.15	Cordova.....	.....	.....	.....	.....
Grasmere f.....	83	40	65.8	2.75	Dixon f.....	74	0	32.4	2.13
Green Cove Sp'gs f.....	80	34	61.9	1.73	Dubuoy f.....	70	12	42.0	3.24
Homeland f.....	84	41	65.7	2.97	East Peoria f.....	72	13	36.8	2.39
Kissimmee f.....	86	40	67.0	2.78	Fort Sheridan f.....	68	3	34.5	2.87
Lake City f.....	81	37	63.8	3.45	Galva f.....	75	2	35.5	2.25
Manatee f.....	85	40	67.0	2.78	Galva f.....	75	2	35.5	2.25
Merritts Island f.....	82	48	68.1	1.99	Greenville f.....	74	6	40.0	1.25
Moseley Hall f.....	80	30	59.9	2.20	Griggsville f.....	74	6	40.0	1.25
Mullet Key f.....	78	45	64.9	1.40	Havana f.....	74	11	41.2	0.76
Myers f.....	84	48	68.4	2.03	Jordans Grove f.....	72	14	44.4	1.68
New Smyrna f.....	83	43	64.6	3.00	Kankakee f.....	66	4	34.7	.....
Ocala f.....	83	35	63.6	1.96	Lagrange f.....	70	2	35.3	2.26
Orange City f.....	86	39	66.6	2.67	Louisville f.....	72	13	42.4	2.90
Orlando f.....	86	39	66.9	2.67	McLeansboro f.....	71	14	42.9	2.48
Oxford f.....	78	36	63.2	1.83	Martinsville f.....	77	11	39.3	3.14
Plant City f.....	88	36	67.4	2.58	Mascoutah f.....	68	14	40.2	1.60
Saint Francis B'ks.....	77	34	61.2	3.97	Mattoon f.....	70	16	43.8	2.60
Saint Petersburg f.....	84	44	66.8	3.18	Mount Carmel f.....	71	5	39.3	1.64
Tallahassee f.....	76	31	58.9	2.53	Mount Pulaski f.....	70	16	41.4	2.56
Tarpon Springs f.....	85	39	66.1	1.93	Muddy Valley f.....	70	10	43.0	3.10
<b>Georgia.</b>	.....	.....	.....	.....	Olney f.....	69	9	36.0	3.67
Adairsville f.....	77	21	50.4	1.43	Oregon f.....	73	2	36.2	2.05
Alapaha f.....	82	26	57.6	1.79	Oswego f.....	68	2	32.2	2.25
Albany f.....	79	27	56.8	1.81	Ottawa f.....	73	4	35.2	2.18
Americus f.....	80	22	55.5	1.28	Palestine f.....	70	12	39.8	3.12
Athens f.....	73	22	51.2	1.39	Paris f.....	70	7	40.0	.....
Athens b f.....	75	18	50.0	2.23	Peoria f.....	.....	.....	.....	.....
Bainbridge f.....	83	31	59.1	2.40	Peoria f.....	75	7	39.2	2.21
Bainbridge b f.....	.....	.....	.....	2.55	Philo f.....	72	7	38.2	3.48
Blakely f.....	77	29	56.9	2.52	Quincy f.....	67	1	36.8	2.19
Brat f.....	81	24	55.4	2.90	Rantoul f.....	69	2	32.6	2.34
Camak f.....	77	22	53.1	1.54	Riley f.....	67	3	35.3	1.71
Camilla.....	79	27	56.0	2.16	Rockford f.....	78	8	39.4	1.72
Canton f.....	70	14	46.4	2.49	Rushville.....	78	17	43.0	3.20
Clayton.....	76	17	52.6	0.06	Saint John f.....	70	9	40.0	2.80
Cohutta.....	86	25	57.9	1.65	Streator f.....	68	0	33.8	2.74
Columbus f.....	.....	.....	.....	.....	Sycamore f.....	.....	.....	.....	.....

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<b>Illinois—Cont'd.</b>					<b>Iowa—Cont'd.</b>				
Walnut f.....	75	0	36.6	2.11	Osage *† 2	73	0	27.3	0.73
Warsaw f.....	71	3	32.9	1.67	Oakaloosa f.....	73	0	34.6	1.24
Winnebago f.....	71	3	32.9	1.67	Ovid f.....	72	1	34.7	1.16
<b>Indiana.</b>					<b>Panama f.....</b>				
Angola * 1	68	7	38.3	3.65	Richland * 1	78	0	33.5	1.96
Ashboro f.....	69	9	41.1	3.35	Rock Rapids.....	72	6	31.6	0.30
Bedford f.....	73	11	41.4	1.91	Rockwell City.....	72	6	31.6	0.30
Butlerville f.....	68	10	41.1	2.23	Sibley.....	74	9	30.4	0.17
Cambridge City f.....	66	7	39.0	2.80	Spirit Lake f.....	77	13	32.2	0.28
Columbia City * 1	62	8	35.9	3.10	Storm Lake f.....	73	3	33.8	1.03
Columbus.....	70	12	41.8	2.72	Tipton f.....	70	0	34.8	2.08
Connersville f.....	68	10	40.4	2.46	Villisca f.....	70	3	38.4	0.46
Decatur f.....	73	16	44.4	2.85	Vinton f.....	71	6	33.0	1.21
Delphi.....	63	6	30.7	2.94	Washington f.....	78	.....	36.6	0.90
Evansville f.....	65	10	39.0	3.35	Webster City f.....	74	3	31.0	1.40
Farmland f.....	67	9	39.4	2.49	Williams f.....	73	9	30.2	1.57
Franklin * 1	62	6	33.2	2.28	<b>Kansas.</b>				
Hawpact f.....	67	9	40.4	3.36	Abilene f.....	76	10	41.4	0.87
Huntington * 1	72	14	43.3	3.38	Achilles *† 2	76	5	29.5	0.05
Jeffersonville * 1	70	16	43.6	2.89	Allison *† 2	73	1	33.4	0.10
Kokomo f.....	67	7	39.3	2.93	Altos *† 3	75	17	37.8	1.46
Laconia f.....	64	13	43.2	3.15	Atchison f.....	78	11	40.2	0.95
Lafayette f.....	67	6	38.6	2.65	Beloit f.....	71	10	41.2	1.58
Logansport f.....	68	11	40.2	3.51	Bucklin.....	.....	.....	.....	.....
Logansport b.....	68	11	40.2	3.51	Cawker City * 1	75	10	38.8	1.00
Madison b.....	70	13	42.8	3.21	Colby f.....	74	2	37.5	0.18
Marengo * 1	74	15	42.8	3.30	Coldwater f.....	81	10	40.8	.....
Marion f.....	72	9	42.0	3.00	Collyer * 2	92	20	47.8	.....
Markle f.....	68	7	38.3	3.72	Columbus f.....	73	12	42.0	1.42
Mauney.....	69	6	39.0	2.63	Cunningham f.....	85	8	40.4	0.34
Mount Vernon f.....	72	16	43.3	2.97	Downs.....	.....	.....	.....	.....
Muncie f.....	68 <sup>a</sup>	12	39.4 <sup>b</sup>	6.50	El Dorado f.....	81	15	42.3	1.06
New Albany *† 1	71	13	44.6	3.35	Elk City * 1	79	19	42.9	1.00
Princeton *† 1	72	14	42.0	2.43	Ellis * 5	88	20	47.4	.....
Rockville f.....	68	8	40.0	3.30	Emporia f.....	78	15	40.9	0.90
Rushville f.....	.....	.....	.....	3.01	Englewood f.....	86	9	43.0	0.17
Seymour f.....	69	12	41.3	2.38	Eureka Ranch f.....	82	4	37.1	0.40
Serre Haute f.....	71	13	42.7	2.90	Fort Riley f.....	65	18	41.8	1.50
Union City f.....	66	8	38.6	2.48	Garden City f.....	76	6	39.4	0.47
Valparaiso f.....	65	8	35.9	1.45	Gibson * 1	76	5	35.0	0.30
Vevay f.....	70	14	43.3	1.40	Gove *† 1	78	6	36.8	0.43
Worthington f.....	78	11	41.6	3.32	Grainfield * 1	72	18	44.6	.....
<b>Indian Territory.</b>					Grnela * 1	80	18	41.0	2.10
Eufaula f.....	.....	.....	.....	3.36	Grinnell * 5	80	10	37.2	0.20
Gwendale f.....	72	23	49.1	0.27	Hays City.....	79	4	38.5	.....
Kemp f.....	83	21	51.2	2.69	Horton f.....	76	10	40.1	1.42
Lehigh f.....	76	18	47.8	3.98	Hutchinson f.....	83	12	44.2	0.40
Purcell f.....	94	19	49.0	1.74	Independence f.....	82	16	41.8	1.44
Pulsa f.....	.....	.....	.....	1.70	Kiowa f.....	86	13	45.8	1.01
<b>Iowa.</b>					Lakin.....	86	0	40.7	0.32
Algona * 1	74	10	31.9	0.60	Lebo f.....	82	12	41.8	1.14
Alta f.....	72	9	31.0	0.96	Leoti f.....	75	2	37.8	.....
Amana f.....	70	1	33.2	1.73	Liberal f.....	83	9	38.3	0.42
Ames b.....	72	3	32.4	0.65	Macksville f.....	80	9	42.0	0.32
Ames c.....	.....	.....	.....	0.43	McPherson f.....	75	10	41.2	0.66
Ames (near) * 1	80	2	35.3	0.46	Manhattan b.....	79	9	37.2	0.81
Atlantic *† 1	78	3	33.7	0.77	Manhattan c.....	72	10	34.8	0.74
Audubon.....	70	4	33.3	1.00	Marion f.....	78	12	38.8	1.22
Belle Plaine f.....	71	5	32.7	1.51	Marmaton.....	.....	.....	.....	1.11
Bonaparte f.....	75	4	35.6	1.61	Medicine Lodge f.....	.....	.....	.....	1.23
Carroll f.....	72	5	31.6	0.77	Minneapolis f.....	75	13	39.5	0.73
Cedar Falls f.....	75	7	32.3	0.55	Monument * 1	79	6	38.5	0.08
Cedar Rapids f.....	68	3	34.3	1.24	Morland f.....	80	3	39.0	0.21
Centerville f.....	75	2	37.3	1.45	Morton f.....	78	11	41.8	.....
Charles City f.....	70	10	31.1	1.09	Mount Hope * 1	81	15	43.0	0.73
Clarinda f.....	70	2	34.8	1.05	Oberlin f.....	.....	.....	.....	0.10
Clinton f.....	73	1	33.2	1.77	Oswego f.....	79	9	43.6	1.02
College Springs.....	72	6	36.6	1.02	Phillipsburg f.....	84	2	46.2	0.03
Corning b.....	72	2	37.4	1.10	Pleasant Dale * 1	76	0	38.1	0.03
Cresco f.....	72	12	29.5	0.84	Quinter * 1	68	10	38.5	0.01
Decorah f.....	79	13	31.4	1.51	Rome *† 1	82	17	42.2	1.31
Delaware * 2	65	8	29.6	1.81	Sedan f.....	80	17	42.7	2.12
Des Moines (near)† 1	73	0	36.5	1.22	Sharon Springs.....	.....	.....	.....	0.20
Elkader f.....	73	8	31.0	1.27	Sterling f.....	76	12	43.6	0.33
Emmetsburg f.....	76	8	30.1	0.10	Topeka.....	81	10	41.4	1.37
Fort Madison *† 1	68	8	36.8	2.25	Tribune f.....	76	7	40.0	0.10
Fulton f.....	.....	.....	.....	1.05	Wakenell * 1	78	12	40.6	1.44
Galva f.....	74	4	33.4	0.79	Wallace f.....	.....	.....	.....	0.20
Glenwood f.....	86	2	40.0	0.23	Wallace * 6	78	10	43.0	0.02
Grand Meadow * 1	67	8	32.3	1.34	Wamego * 1	80	10	37.9	0.02
Greenfield f.....	75	1	33.9	0.91	Washington f.....	81	6	37.6	0.83
Grinnell f.....	68	0	38.7 <sup>a</sup>	1.85	Winona * 2	76	12	41.3	0.02
Grundy Center f.....	72	9	31.4	1.11	Yates Center f.....	79	.....	.....	1.18
Hampton f.....	73	9	30.1	1.93	<b>Kentucky.</b>				
Hopewille f.....	.....	.....	.....	0.60	Bowling Green *† 1	73	14	43.1	4.03
Hopkinton f.....	.....	.....	.....	2.10	Burnside f.....	.....	.....	.....	3.22
Humboldt f.....	.....	.....	.....	0.31	Caddo *† 1	74	11	44.0	4.00
Independence f.....	72	10	34.0	0.63	Canton *† 1	75	17	45.9	3.76
Indianola f.....	72	0	39.0	1.68	Carrollton *† 1	71	14	43.8	2.35
Iowa City f.....	74	2	36.6	1.75	Cattlesburg *† 2	62	2	43.9	3.00
Iowa Falls f.....	72	7	31.0	1.37	Eardington f.....	78 <sup>a</sup>	20 <sup>a</sup>	49.5 <sup>a</sup>	2.42
Jefferson f.....	70	5	36.5	0.56	Earlville f.....	.....	.....	.....	2.98
Keosauqua f.....	74	7	38.2	1.24	Edmonton f.....	68	13	43.8	3.63
Knoxville.....	71	2	34.9	0.97	Elizabethtown f.....	67	13	41.2	2.06
Larrabee f.....	74	9	32.0	0.95	Eubank f.....	74	7	42.0	3.37
Le Claire f.....	.....	.....	.....	1.56	Falmouth f.....	.....	.....	.....	2.87
Logan f.....	72	0	35.0	0.53	Fords Ferry f.....	76	16	47.4	3.24
Maquoketa f.....	72	0	33.3	1.21	Franklin *† 1	78	18	47.1	2.75
Mason City f.....	69	.....	.....	0.63	Greendale * 1	68	8	39.0	2.70
Maxon f.....	72	9	33.8	1.23	Greensburg *† 1	75	16	43.4	2.83
Mechanicville.....	69	1	33.1	1.62	Harrodsburg f.....	79	9	42.6	3.35
Monticello *† 1	68	5	31.0	1.80	Hillsdale * 1	73	18 <sup>a</sup>	48.1 <sup>a</sup>	.....
Mount Vernon * 1	71	4	34.2	.....	Louisa f.....	69	11	43.8	3.32
Newton.....	71	5	34.3	1.43	Matlock f.....	72	16	47.4	3.22



Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<b>Kentucky—Cont'd.</b>	0	0	0	Ins.	<b>Massachusetts.</b>	0	0	0	Ins.
Middlesboro f <sup>1</sup> .....	67	12	43.8	1.00	Adams a.....	60	15	37.7	2.66
Mount Sterling f <sup>1</sup> .....	70	12	41.4	3.48	Amherst Ex. St'n a <sup>1</sup> .....	62	10	36.9	1.90
Munfordville f <sup>1</sup> .....	70	15	46.0	.....	Andover.....	68	13	40.5	3.16
Paducah a f <sup>1</sup> .....	78	19	47.0	3.19	Ashland.....	67	10	38.5	1.95
Paducah b f <sup>1</sup> .....	74	14	45.7	3.29	Beverly Farms.....	65	14	39.7	1.92
Pellville f <sup>1</sup> .....	73	16	43.0	1.89	Blue Hill (sum'm) <sup>1</sup> .....	65	16	39.4	2.17
Princeton f <sup>1</sup> .....	78	16	44.6	3.09	Blue Hill (valley) <sup>1</sup> .....	68	9	38.5	2.16
Russellville f <sup>1</sup> .....	73	8	42.9	4.00	Boston.....	68	14	41.0	1.79
Sandy Hook f <sup>1</sup> .....	70	14	44.2	3.22	Cambridge a.....	68	17	40.0	1.90
Shelby City f <sup>1</sup> .....	69	13	43.3	3.41	Cambridge b.....	68	12	40.6	2.00
Shelbyville f <sup>1</sup> .....	69	13	43.3	3.41	Chestnut Hill.....	68	12	40.6	2.00
South Fork f <sup>1</sup> .....	69	13	43.3	3.41	Clinton.....	65	10	38.6	3.00
Williamsburg a f <sup>1</sup> .....	69	13	43.3	3.41	Concord a f <sup>1</sup> .....	65	10	38.6	3.00
<b>Louisiana.</b>					Dudley f <sup>1</sup> .....	65	12	38.4	2.04
Abbeville f <sup>1</sup> .....	86	31	59.8	8.05	East Templeton a <sup>1</sup> .....	65	10	34.8	0.84
Alexandria f <sup>1</sup> .....	80	24	52.4	7.40	Egg Rock, Nahant.....	62	20	40.8	.....
Amite f <sup>1</sup> .....	84	27	56.6	6.28	Fall River a <sup>1</sup> .....	63	19	41.6	3.84
Baton Rouge f <sup>1</sup> .....	79	33	55.6	6.99	Fiskdale.....	58	12	36.8	2.02
Calhoun.....	81	26	52.2	4.78	Fitchburg a <sup>1</sup> .....	61	17	37.4	2.33
Camoron f <sup>1</sup> .....	89	25	59.5	6.04	Fitchburg b.....	64	9	38.8	2.33
Cheneyville f <sup>1</sup> .....	89	25	59.5	6.04	Frammingham.....	61	10	35.8	2.40
Clinton f <sup>1</sup> .....	89	25	59.5	6.04	Gilbertville.....	67	11	36.7	3.41
Couhatcha a f <sup>1</sup> .....	84	23	56.6	8.24	Great Barrington f <sup>1</sup> .....	67	11	36.7	3.41
Couhatcha b f <sup>1</sup> .....	84	23	56.6	8.24	Groton a.....	63	8	35.9	2.55
Oovington f <sup>1</sup> .....	73	30	49.6	6.12	Hadley.....	60	9	35.0	2.55
Davis.....	80	23	51.4	6.84	Hingham.....	66	22	44.2	2.26
Delhi f <sup>1</sup> .....	83	32	60.2	5.43	Hyannis f <sup>1</sup> .....	66	22	44.2	2.26
Donaldsonville f <sup>1</sup> .....	83	32	60.2	5.43	Kendall Green.....	66	22	44.2	2.26
Emilie f <sup>1</sup> .....	81	33	57.7	6.27	Lake Cochituate.....	66	22	44.2	2.26
Farmerville.....	83	26	53.2	6.48	Lawrence.....	63	12	38.6	1.82
Franklin f <sup>1</sup> .....	79	34	59.4	8.82	Leeds.....	58	8	35.8	2.80
Girard f <sup>1</sup> .....	89	23	49.2	5.25	Leicester.....	60	14	37.0	1.53
Grand Coteau f <sup>1</sup> .....	80	33	57.8	6.42	Leominster a <sup>1</sup> .....	62	12	36.0	2.31
Hamburg f <sup>1</sup> .....	80	33	57.8	6.42	Long Plain a <sup>1</sup> .....	64	14	36.4	1.98
Hammond f <sup>1</sup> .....	80	33	57.8	6.42	Lowell a.....	62	12	36.0	2.31
Houma f <sup>1</sup> .....	86	34	61.0	4.01	Lowell b.....	67	10	38.6	.....
Joanette f <sup>1</sup> .....	84	30	60.0	6.70	Ludlow Center.....	65	9	35.6	1.62
Lafayette f <sup>1</sup> .....	88	30	59.8	7.28	Lynn b.....	70	18	43.1	2.71
Lake Charles f <sup>1</sup> .....	76	31	59.3	5.80	Mansfield a <sup>1</sup> .....	61	9	38.0	2.15
Lake Providence f <sup>1</sup> .....	80	24	53.0	3.00	Medford.....	69	10	39.0	2.67
Lawrence f <sup>1</sup> .....	84	27	58.2	6.39	Middleboro.....	62	15	40.2	1.98
Maurepas.....	85	32	62.5	6.23	Milton a <sup>1</sup> .....	62	15	40.2	1.98
Melville f <sup>1</sup> .....	82	20	53.8	7.02	Monroe.....	57	4	32.8	1.14
Minden f <sup>1</sup> .....	81	27	55.2	5.61	Monroe.....	57	4	32.8	1.14
Monroe f <sup>1</sup> .....	81	27	55.2	5.61	Mount Nonotuck.....	62	15	40.2	1.98
Natchitoches f <sup>1</sup> .....	83	29	58.5	5.76	Mystic Lake.....	62	15	40.2	1.98
Opelousas f <sup>1</sup> .....	83	29	58.5	5.76	Mystic Station.....	66	18	40.7	2.63
Oxford.....	84	22	53.4	7.78	New Bedford a <sup>1</sup> .....	66	15	41.2	2.71
Paincourtville f <sup>1</sup> .....	83	31	57.4	8.10	New Bedford b <sup>1</sup> .....	66	15	41.2	2.71
Plaquemine.....	79	30	58.6	6.00	Newburyport b.....	67	15	41.4	1.77
Rayne f <sup>1</sup> .....	85	27	57.6	5.83	North Billerica.....	66	15	41.2	2.71
Roseland.....	82	30	57.3	6.90	Plymouth.....	67	15	41.4	1.77
Schriever f <sup>1</sup> .....	83	29	58.5	5.76	Provincetown.....	64	19	42.2	2.47
Shell Beach.....	80	34	59.2	3.19	Randolph.....	68	18	41.4	1.83
Sugar Ex. Station f <sup>1</sup> .....	80	33	59.1	7.50	Roberts Dam.....	68	18	41.4	1.83
Thibodaux.....	83	29	58.5	5.76	Royalston a <sup>1</sup> .....	56	18	36.5	1.50
Wallace.....	83	34	59.0	6.48	Salisbury.....	66	14	42.2	2.53
West End.....	83	34	59.0	6.48	South Dennis.....	65	18	41.4	2.50
Winnfield.....	83	27	55.0	6.51	Springfield Arm'y.....	60	12	38.0	2.08
Winnsboro.....	86	34	61.0	2.16	Taunton b.....	70	13	40.5	2.37
<b>Maine.</b>					Taunton c.....	69	9	39.7	2.97
Bar Harbor.....	60	11	38.5	2.23	Taunton d <sup>1</sup> .....	71	10	40.8	1.66
Belfast a <sup>1</sup> .....	56	14	36.2	2.46	Turners Falls.....	60	12	38.3	3.04
Calais f <sup>1</sup> .....	61	12	37.2	2.21	Wakefield f <sup>1</sup> .....	63	18	39.3	2.15
Cornish a <sup>1</sup> .....	57	10	35.2	3.24	Waltham.....	65	9	39.4	3.11
Easton.....	60	10	36.6	1.45	Webster.....	65	9	39.4	3.11
Fairfield.....	55	13	36.0	0.80	Wellesley.....	65	10	39.8	2.02
Farmington f <sup>1</sup> .....	59	10	34.5	3.99	Westboro f <sup>1</sup> .....	65	10	39.8	2.02
Fort Kent f <sup>1</sup> .....	55	4	29.5	1.13	Williamstown f <sup>1</sup> .....	60	15	36.2	1.22
Gardiner.....	57	12	35.7	1.83	Winchendon f <sup>1</sup> .....	60	15	36.2	1.22
Houlton f <sup>1</sup> .....	53	8	30.6	0.86	Winchester.....	66	16	40.9	1.69
Lewiston f <sup>1</sup> .....	60	14	35.5	2.31	Winthrop.....	66	16	40.9	1.69
Mattawamkeag a <sup>1</sup> .....	56	6	35.6	1.08	Worcester a.....	60	15	38.0	2.21
Mayfield.....	54	4	30.8	3.49	Worcester b.....	61	14	38.5	2.28
North Bridgeton.....	57	14	36.3	2.73	<b>Michigan.</b>				
Orono f <sup>1</sup> .....	57	9	33.7	1.43	Adrian.....	67	11	37.3	5.27
Petit Menan a <sup>1</sup> .....	54	17	39.5	.....	Albion.....	61	12	37.2	3.26
West Jonesport a <sup>1</sup> .....	54	7	36.7	.....	Allegan.....	67	14	36.6	3.19
<b>Maryland.</b>					Alma.....	65	10	35.6	3.06
Bachmans Val. a <sup>1</sup> .....	53	10	34.7	4.03	Ann Arbor f <sup>1</sup> .....	60	14	36.5	3.68
Barren Cr'k Sp'gs f <sup>1</sup> .....	73	18	45.1	3.24	Arbela.....	60	14	36.5	3.68
Benedict f <sup>1</sup> .....	70	21	45.4	3.86	Ball Mountain.....	60	10	36.6	3.08
Bootherville a <sup>1</sup> .....	66	13	38.6	3.90	Bear Lake.....	59	14	33.8	2.57
Cambridge.....	67	30	48.2	6.25	Bellaire.....	68	6	34.0	2.83
Charlotte Hall f <sup>1</sup> .....	73	18	44.6	.....	Benton Harbor.....	66	12	36.0	3.51
Chestertown f <sup>1</sup> .....	60	22	42.0	2.40	Berlin a <sup>1</sup> .....	64	14	35.2	3.26
Cumberland a f <sup>1</sup> .....	62	14	39.0	2.01	Berrien Springs a <sup>1</sup> .....	62	13	38.2	3.20
Cumberland b.....	65	20	44.6	2.80	Berrien Springs b.....	62	13	38.2	3.20
Darlington f <sup>1</sup> .....	62	19	41.4	3.87	Birmingham f <sup>1</sup> .....	63	13	37.7	3.28
Denton f <sup>1</sup> .....	71	21	46.8	2.55	Boon.....	60	4	32.9	3.43
Euston f <sup>1</sup> .....	64	23	44.0	3.87	Bronson.....	70	2	34.9	2.14
Fallston a <sup>1</sup> .....	60	19	40.9	4.53	Brown City.....	63	10	35.8	3.25
Fenby f <sup>1</sup> .....	60	16	40.8	3.30	Calumet.....	63	8	39.6	2.50
Frederick f <sup>1</sup> .....	62	19	40.9	3.05	Charlevoix.....	68	15	38.8	2.90
Great Falls a <sup>1</sup> .....	64	15	42.0	3.08	Cheboygan.....	65	13	38.8	2.96
Gr. St. Marys Col f <sup>1</sup> .....	60	13	41.0	4.57	Climax a <sup>1</sup> .....	74	8	36.3	3.31
New Market a <sup>1</sup> .....	61	16	39.6	2.70	Clinton.....	66	10	36.8	3.60
Oakland f <sup>1</sup> .....	60	1	34.2	3.44	Crystal Falls.....	67	2	32.4	1.00
Solomons f <sup>1</sup> .....	70	24	47.6	4.66	Fairview.....	62	7	35.3	2.98
Sunnyvale f <sup>1</sup> .....	66	0	35.1	2.97	Fitchburg.....	62	9	35.0	3.36
Taneytown f <sup>1</sup> .....	66	0	35.1	2.97					
Upper Marlboro f <sup>1</sup> .....	68	17	42.6	4.42					
Valley Lee.....	68	17	42.6	4.42					
Woodstock f <sup>1</sup> .....	62	15	41.8	3.70					

Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<b>Michigan—Cont'd.</b>					<b>Mississippi—Cont'd.</b>				
Flint <sup>2</sup>	63	18*	33.0	2.62	Batesville†	76	20	50.0	5.26
Gaylord	63	6	33.0	7.36	Biloxi†	78	32	60.0	5.84
Grand Rapids <sup>1</sup>	64	12	36.6	3.50	Briers	80	30	55.8	5.76
Grape	66	11	38.5	3.11	Brookhaven†	79	25	52.8	5.72
Hanover	62	9	37.9	2.87	Canton†	77	27	53.1	4.57
Harbor Springs <sup>1</sup>	67	15	35.9	2.34	Clarksdale†	79	23	51.8	5.06
Harrison†	62	3	29.7	2.10	Columbus a†	76	23	54.1	2.61
Harrisville <sup>1</sup>	58	12	34.2	2.32	Columbus b†	76	23	54.1	2.61
Hart	60	10	30.8	1.55	Corinth†	82	26	51.6	4.01
Hastings	62	7	34.6	3.48	Crystal Springs†	81	25	55.0	4.49
Hayes	63	12	37.7		Duck Hill†	77	24	52.4	3.61
Howell	66	8	30.0	2.57	Edwards	79	27	54.3	4.63
Jeddo <sup>1</sup>	69	13	36.4	2.99	Enterprise†	80	21	51.4	4.78
Kalamazoo	63	12	36.5	2.99	Fayette†	78	28	56.4	4.75
Lansing <sup>1</sup>	68	12	36.0	2.46	French Camps†	76	19	48.6	2.95
Lathrop <sup>1</sup>	60	2	31.4	1.60	Greenville b†	80	24	53.2	6.32
Lewiston	62	9	33.7	2.29	Hattiesburg†	82	26	58.2	6.90
Lodi	65	5	34.0	2.94	Hawthorne†	81	26	55.4	4.63
Madison	63	11	36.8	3.73	Hernando†	77	22	51.3	2.79
Mayville	63	11	36.3	2.69	Holly Springs†*	68	32	47.0	3.04
Mio <sup>1</sup>	64	12	35.4		Jackson†	78	26	55.4	4.06
Mottville	66	3	30.2	2.95	Kosciusko†	79	24	51.2	2.60
North Marshall	65	7	33.0	2.39	Lake†	83	26	53.4	3.97
Olivet	61	9	34.8	2.66	Logtown†	78	32	57.7	5.70
Ovid	62	13	35.4	2.31	Louisville†	78	19	51.6	3.02
Parkville				3.51	McComb†	77*	21*	51.6*	4.40
Rawsonville <sup>1</sup>	66	16	37.8	4.35	Macon†	79	22	52.2	4.44
Rockland	75	2	31.0	2.76	Moss Point†	78	33	58.4	
Saint Ignace	61	13	33.7	3.35	Okolona†	76	20	49.1	2.40
Sand Beach	65	17	35.4	2.37	Palo Alto† <sup>1</sup>	78	24	50.4	3.43
Stanton	63	10	34.2	1.97	Pontotoc†	75	23	51.5	2.99
Thornville†	64	15	37.7	3.15	Port Gibson†	83	22	53.4	4.94
Vandalia	60	6	36.4	3.38	Stonington <sup>1</sup>	80	30	55.9	
Washington	63	9	36.7	3.87	Water Valley <sup>1</sup>	80	22	50.6	5.48
Williamston <sup>1</sup>	65	12	38.1	2.60	Waynesboro <sup>1</sup>	75	28	50.0	4.15
Ypsilanti	63	9	36.6	4.14	Woodville†	83	28	56.5	6.07
<b>Minnesota.</b>					Yazoo City†	96	24	56.4	4.32
Ada†	62	-27	22.6	0.32	<b>Missouri.</b>				
Albert Lea† <sup>1</sup>	72	-10	28.9	0.73	Appleton City†	75	11	43.0	1.23
Alexandria†				0.52	Arlington†				1.66
Alexandria <sup>1</sup>	70	-19	22.6	0.60	Arthur <sup>2</sup>		11	35.0	1.90
Barrett <sup>1</sup>	70	-12	27.9	0.20	Bethany	72	5	37.0	0.89
Beardsley†	73	-18*	29.8*	0.16	Big Piney				1.40
Belle Plaine <sup>1</sup>	70	-13	28.6	0.58	Birch Tree	73	9	42.8	1.58
Bingham Lake†	74*	-12*	29.0*	1	Bluffton <sup>1</sup>	75	8	43.7	2.42
Bird Island	72	-13	28.2	0.47	Boonville†				1.50
Blooming Prairie <sup>1</sup>	72	-17	27.2	0.65	Brunswick	74	10	41.6	2.05
Bonniwells Mills†	77	-15	30.6	0.45	Cape Girardeau†				1.10
Caledonia†	70	-12	31.4	1.74	Carrollton†	72	14	42.2	2.43
Cambridge†	71	-20	28.6	0.52	Carthage†				0.89
Camden†	75	-21	30.4	0.20	Conception	70	9	41.2	1.01
Carver† <sup>2</sup>			29.8	0.50	Darksville†	78	10	45.6	1.72
Clear Lake†	69	-20	27.0	0.78	Downing				1.74*
Clearwater <sup>1</sup>	79	-16	30.5		East Lynne <sup>2</sup>			37.6	1.56
Collegeville	72	-11	31.8	0.68	Edge Hill <sup>1</sup>	70	10	42.3	2.71
Crookston a†	60*	-30	21.4*		Eight Mile <sup>1</sup>	72	14	40.6	1.52
Dawson†	72	-10	29.2	0.85	Eldon <sup>1</sup>	74	12	43.3	1.52
Farmington† <sup>1</sup>	72	-18	29.3	1.25	Emma <sup>2</sup>		12	40.7	1.37
Fergus Falls† <sup>1</sup>	70	-16	25.0	0.20	Fairport				0.72
Fort Ripley†				0.66	Farmersville				1.15
Grand Meadow† <sup>1</sup>	74	-22	27.4	0.45	Fayette	79	8	41.2	2.13
Granite Falls	73	-16	28.6	0.13	Fox Creek <sup>1</sup>	72	12	42.7	1.57
Hastings <sup>1</sup>	69	-11	31.6	1.46	Fulton				1.53
Hutchinson <sup>1</sup>	68	-14	27.1	0.35	Gallatin <sup>1</sup>	74	7	39.9	1.12
L Winnibogishish <sup>1</sup>	67	-18	21.7	1.32	Gayoso <sup>2</sup>	72	22	46.2	4.72
Leech Lake <sup>1</sup>	62	-24	23.7	1.09	Glasgow <sup>1</sup>	76	8	40.7	2.00
Long Prairie†	71	-25	24.6	1.25	Gordonville† <sup>1</sup>		18	41.7	2.44
Maple Plain	71	-17	29.6	1.04	Gorin <sup>2</sup>	68	11	36.8	1.82
Marfield†	64	-20	23.1	1.03	Grove Dale	74	3	29.2	1.53
Maple Falls <sup>1</sup>	70*	-14	27.7	0.80	Half Way				1.42
Medford <sup>1</sup>	74	-18	26.7	0.75	Harrisonville†	75	4	39.3	1.48
Milant†	75*	-21	27.6	0.45	Hastain	71	8	40.6	1.48
Minneapolis a†	69	-13	30.1	1.08	Hermann†				1.57
Minneapolis b†	73*	-13	29.2		Houston	69	5	41.2	1.91
Minneapolis c† <sup>1</sup>	73	-11	29.8	0.89	Humansville	70	6	41.2	2.25
Minnesota City† <sup>1</sup>	67	-8	31.0	1.10	Ironton <sup>1</sup>	70	13	40.8	2.37
Montevideo†	76	-17	29.9	0.29	Jefferson City†	76	17	41.7	1.80
Morris <sup>1</sup>	70	-16	25.1	0.45	Kidder	73	6	39.8	1.00
New London	73	-18	28.2	0.70	Lamar†	76	14	43.2	1.48
New Richland <sup>1</sup> a	78	-10	32.0		Lamonte†				1.86
New Ulm	70	-8	31.6	0.81	Langdon†	75	5	37.4	0.80
Ortonville†				0.50	La Plata <sup>1</sup>	70	14	40.2	1.84
Park Rapids†	67	-23	24.2	0.50	Lebanon	70	8	43.0	1.51
Pine River <sup>1</sup>	69	-15	25.4	0.60	Lexington†	74	10	42.2	1.78
Pokegama Falls <sup>1</sup>	70*	-23	22.8	0.92	Liberty	74	11	41.0	1.12
Red Wing†				0.45	Linn Creek	78	8	41.2	1.17
Redwood Falls†				0.30	Louisiana Bridge†				1.06
Rochester <sup>1</sup>	77	-18	30.8	0.40	McCune <sup>1</sup>	73	-1	40.2	1.08
Rolling Green† <sup>1</sup>	70	-8	29.2	0.90	Marble Hill <sup>1</sup>	69	12	41.6	2.75
Royalton†	72*	-26	24.5	1.20	Marceline				2.11
Saint Charles† <sup>1</sup>	70	-11	29.8	0.92	Marshall† <sup>1</sup>	74	7	39.3	1.94
Saint Cloud <sup>1</sup>	66	-14	28.3	0.81	Mine La Motte†	75	14	44.1	1.83
Saint Oloff†	71*	-15*	24.6*	0.32	New Boston	70	6	37.2	1.44
Saint Peter†	77	-8	33.1	0.59	New Hartford <sup>1</sup>	76	8	41.0	1.26
Sandy Lake Dam <sup>1</sup>	69*	-15	24.7	0.72	New Haven <sup>1</sup>	74	12	42.9	1.38
Sauk Center <sup>1</sup>	72	-22	22.4	0.70	New Madrid	75	21	47.7	3.59
Starbuck <sup>1</sup>	73	-17	26.1	0.30	New Palestine				1.71
Wabasha <sup>1</sup>	68	-6	32.0	1.06	Oakfield†	72	10	43.2	1.59
Waconia <sup>1</sup>	72	-16	30.8	1.30	Oak Ridge <sup>1</sup>		18	43.8	1.40
Warren†	63	-26	21.9	0.40	Olden†	74	10	45.1	2.74
Willmar† <sup>1</sup>	72	-17	26.3	0.40	Oregon a	76	4	39.8	1.06
Winona <sup>1</sup>	76	-5	34.2	1.42	Oregon b† <sup>1</sup>	74	5	38.0	1.15
<b>Mississippi.</b>					Oseola				1.52
Aberdeen†	78	16	47.6	3.31	Palmyra				1.40
Agricultural Col'ge <sup>1</sup>	76	24	52.4	2.99	Panacea	74	7	41.8	1.86



## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>Missouri—Cont'd.</i>	°	°	°	<i>Ins.</i>	<i>Nebraska—Cont'd.</i>	°	°	°	<i>Ins.</i>
Phillipsburg *†1...	70 <sup>d</sup>	9	40.5 <sup>d</sup>	1.54	Table Rock *†1...	83	10	39.3	0.41
Pickering *†1...	70	7	37.4	1.12	Tecumseh *†1...	64 <sup>f</sup>	13 <sup>e</sup>	33.4 <sup>f</sup>	0.90
Platte River *†1...	72	12	35.2	0.73	Wallace *†1...	72	4	34.2	0.15
Potosi *†1...	71	5	40.4	1.02	Weeping Water *†1...	70	2	31.8	0.30
Princeton *†1...	73	5	38.3	0.70	West Point *†1...	72	5	37.0	0.40
Rolla *†1...				1.57	Whitman *†1...	60	0	31.3	0.05
Round Springs...				2.84	Wilcox *†1...				0.34
Saint Charles *†1...	75	10	43.1	1.58	York *†1...	70	4	37.6	0.30
Saint Joseph *†1...				0.72					
Saint Louis *†1...	72	11	42.0	1.56	<i>Nevada.</i>				
Sarcozie *†1...	76	17	46.6	1.58	Austin...	54	5	34.8	0.55
Sedalia...	76	9	41.4	2.16	Battle Mountain *†1...	67	7	38.0	0.25
Shelbina...				1.20	Belleville *†1...	74		37.8	0.20
Steelville *†1...		8	37.0	2.70	Belmont...	57	6	35.4	0.12
Steffenville...				1.70	Beowawe *†1...	65	2	34.3	1.27
Stellada *†1...	75	10	44.4	1.45	Candelaria...	70	14	44.4	T.
Unionville...	74	4	32.6	0.50	Carlin *†1...	57	6	28.0	0.30
Vancelev...				0.08	Carson City *†1...	64	3	39.7	1.49
Vermont *†1...	74	9	40.2	1.86	Cranes Ranch...				1.11
Vilas...				0.88	Downeyville...	73	12	44.8	0.27
Virgil City...				1.65	Edgewood...	57	11	36.6	0.55
Warrensburg *†1...	71	12	41.4	1.74	Elko *†1...	60	3	31.5	1.25
Warrenton...	76	10	41.8	1.44	Ely...	58	0	33.8	0.35
Wheatland...				1.54	Empire Ranch...		5		0.11
Whiteside...	70	7	41.6	1.30	Fenelon *†1...	70	4	38.2	1.85
<i>Montana.</i>					Genoa...	71	22	44.3	3.44
Boulder *†1...	60	-10	29.1	0.54	Golconda *†1...	68	10	38.4	0.30
Choteau *†1...	65	-12	29.0	2.10	Gold Hill...	85	12	47.8	0.48
Cokedale *†1...	52		28.6	3.49	Halleck *†1...	60	8	27.9	1.15
Deer Lodge City *†1...	60	-4	30.3	0.93	Hawthorne *†1...	58	22	42.7	0.26
Elk Park *†1...	55		3.58	3.58	Hawthorne *†1...	57	17	41.4	0.26
Fort Custer *†1...	65	-12	31.7	1.68	Hot Springs *†1...	73	15	41.2	0.29
Fort Keogh...	62	-16	26.1	0.49	Humboldt *†1...	48	22	35.4	0.00
Fort Logan...	54	-10	26.2	1.05	Lewers Ranch...	63	13	42.8	3.81
Fort Missoula...	61	1	30.0	1.78	Lovelock *†1...	72	12	42.8	0.30
Glasgow *†1...	65	-25	22.5		Mill City *†1...	67	10	42.2	0.60
Glenlivet *†1...	62	-18	26.0	1.25	Monitors Ranch...	60	2	33.6	0.33
Great Falls *†1...	62	-13	27.6	1.33	Palisade *†1...	62	0	32.8	0.60
Hogan *†1...	67	-15	30.4	1.60	Palmetto...	62	3	36.1	0.70
Martinsdale *†1...	55	-16	28.8	2.35	Reno *†1...	68	19	42.3	0.00
Virginia City *†1...	54	4	32.0	0.29	Reno State Univ'ty...	65	9	38.3	0.42
<i>Nebraska.</i>					Saint Clair...	66	10	39.0	0.04
Agee *†1...	72	-10	31.7	0.43	South Camp *†1...	55	9	36.6	0.70
Ansley *†1...	88	-7	33.8	T.	Stofel...	60	6	29.0	2.31
Arberville *†1...	72	8	33.7	0.75	Sunnyside...	65	15	46.4	0.35
Ashland *†1...	74	0	35.0	0.04	Tecoma *†1...	54	5	31.2	0.55
Ashton *†1...	72	2	33.6	0.11	Toano *†1...	60	0	31.3	1.20
Hassett *†1...	70	-10	32.3	0.46	Tuscarora *†1...	58	4	32.6	2.67
Beatrice *†1...	73	-3	36.8	0.57	Tybo...	68	11	41.3	T.
Beaver City...	79 <sup>e</sup>	2 <sup>e</sup>	37.8 <sup>e</sup>	0.57	Verdi *†1...	63	15	40.6	2.40
Bratton...				1.00	Virginia City...	65	13	43.2	1.26
Callaway *†1...	78	1	35.8	0.05	Wadsworth *†1...	64	14	38.4	0.00
Columbus *†1...	74	4	33.3	0.28	Wells *†1...	54	3	29.3	1.07
Cornelia...				0.49	Winnemucca *†1...	60	7	36.9	0.81
Creighton *†1...	73	-10	31.2	0.20	<i>New Hampshire.</i>				
Crete...	72	4	35.2	0.34	Alstead *†1...	56	9	32.4	1.61
Culbertson *†1...				T.	Antrim...				1.65
David City *†1...	69	-3	30.3	0.55	Belmont...	56	3	30.1	1.85
De Soto...	75	-4	35.3	0.46	Berlin...	56	3	31.8	2.11
Ericson *†1...	72	-4	33.4	T.	Berlin Mills...	57	3	31.8	1.13
Ewing *†1...				0.06	Bethlehem...	56	5	31.8	2.41
Fairbury *†1...	70	16	40.0	0.79	Brookline *†1...	62	7	36.8	2.41
Fort Robinson...	70	-2	35.4	0.23	Concord *†1...	59	8	33.4	2.53
Fort Sidney...	70	-4	35.4	0.13	Dublin...	58	11	34.5	1.90
Franklin *†1...	72	8	36.9	0.80	Durham...	58	9	37.2	2.00
Geneva *†1...	72	0	35.0	1.05	East Canterbury...	52	9	31.0	1.87
Genoa *†1...	70	-2	34.4	0.72	Grafton *†1...	57	7	33.1	1.63
Gering *†1...	70	-1	36.2	0.17	Hanover *†1...	55	10	34.7	0.94
Glenwood *†1...	72	-2	37.5	0.20	Keene...	62	7	35.2	1.40
Haigler *†1...	72	8	33.8	0.10	Lakeport...	59	4	32.6	0.95
Hartington *†1...	74	0	33.4	1.26	Lancaster...	59	4	32.6	0.95
Harvard *†1...	72	1	34.6	0.50	Manchester *†1...	62	13	38.4	1.88
Hay Springs *†1...	66	-5	31.4	0.29	Nashua...	64	9	38.1	1.92
Hebron *†1...	78	9	37.7	0.98	Newton...	62	8	37.0	1.81
Holdrege *†1...	78	4	32.4	0.10	North Conway...	61	4	33.4	1.60
Imperial *†1...	70	12	39.9	0.20	Pennichuck Station...				2.02
Indianola *†1...	80	4	39.1	T.	Peterboro...	58	6	34.8	1.77
Kennedy *†1...	79	-3	33.8	0.21	Plymouth *†1...	56	6	30.3	2.52
Kimball *†1...	70	-2	36.0	0.10	Sanborn *†1...	58	9	34.2	1.56
Lamar...				0.00	Stratford...	59	4	35.0	1.11
Lexington *†1...	82	1	40.2	0.15	Wiers Bridge...				1.63
Lincoln *†1...	73	2	37.0	0.48	West Milan...	56	1	30.4	1.80
Lynch *†1...	72	-10	31.1	0.68	Wolfboro...				1.63
Madrid *†1...	73	6	34.4	0.30	<i>New Jersey.</i>				
Marquette *†1...	74	0		0.77	Allaire...	65	15	41.9	
Minden *†1...	74	2	35.2	0.48	Asbury Park...	65	21	43.2	2.47
Mullen *†1...	70	-2	33.6	0.16	Barnegat...	64	16	41.6	2.71
Nebraska City *†1...	71	10	35.3		Bayonne...	65	21	42.8	3.80
Nesbit *†1...	73	0	34.9	0.15	Belvidere...	64	18	40.4	3.71
Norfolk *†1...	70	-5	32.4	0.35	Beverly *†1...	67	19	40.9	3.71
North Loup *†1...	74 <sup>e</sup>	-5	36.4	0.12	Billingsport *†1...	60	24	42.5	3.07
O'Neill *†1...	76	-10	31.4	0.40	Blairtown...	62	19	40.4	2.90
Oughb *†1...				0.01	Boonton...	60	22	40.6	4.32
Palmer *†1...	72	0	32.7	0.30	Bridgeton *†1...	66	24	45.2	3.36
Plattsburgh *†1...				0.49	Camden...	62	21	42.2	3.32
Ravenna *†1...	79	0	34.8	0.21	Cape May C.H....	67	22	45.2	2.74
Red Cloud...				0.18	Charlotteburg...	60	11	37.7	4.12
Santee Agency *†1...	74	-8	34.5	0.44	Chester...	58	20	38.4	4.49
Seward *†1...	80	-4	38.2	1.20	Deckertown...	59	17	38.4	3.55
Springview...	76	-7	36.6	0.49	Dover...	65 <sup>f</sup>	14 <sup>f</sup>	41.0 <sup>f</sup>	3.55
Stanton *†1...	74	-6	31.0	0.58	Egg Harbor City *†1...	66	17	42.0	3.27
State Farm...	75	1	36.6	0.45	Elizabeth *†1...	63	22	43.2	3.79
Superior *†1...	72	12	38.6	0.74	Franklin Furnace...	58	16	37.8	3.40
Sutton *†1...	72	-1	33.0	0.97	Franklinville...	65	16	41.5	3.53
Syracuse *†1...	72	3	36.9	0.50	Freehold *†1...	65	21	43.4	3.66

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>New Jersey—Cont'd.</i>	°	°	°	<i>Ins.</i>	<i>New York—Cont'd.</i>	°	°	°	<i>Ins.</i>
Friesburg	61	16	39.4	3.34	Palermo† <sup>1</sup>	63	8	35.8	2.32
Gillette	61	16	39.4	3.60	Perry City† <sup>1</sup>	61	15	35.0	0.91
Hanover	63	20	41.4	3.23	Phoenix				1.83
Highland Park†	61	19	41.0	4.93	Pine City				1.59
Hightstown†	63	26	42.8	4.53	Plattsburg B'ks	58	10	35.2	1.28
Imlaystown	64	22	42.6	3.83	Port Jervis	56	15	37.1	3.47
Junction				3.63	Potsdam†	61 <sup>e</sup>	12	34.4	2.05
Lambertville	61	20	39.4	3.88	Poughkeepsie	61	13	39.0	1.83
Millville	68	15	44.0	3.27	Rome	64	8	37.0	2.10
Moorestown <sup>1</sup>	67	19	41.8	3.60	Romulus	63	21	38.8	0.56
Newark a	60	22	41.0	3.65	Rondout†	57	19	38.2	2.20
Newark b† <sup>1</sup>	61	23	43.3	3.30	Setauket†	61	26	42.4	3.18
New Brunswick a	65	21	42.4	3.91	South Canisteo <sup>1</sup>	62	12	35.0	2.03
New Brunswick b.	62	20	41.5	3.99	South Kortright†	60	9	33.3	1.10
Newton	59	16	38.8	2.89	Stillwater†	58	15	38.0	0.53
Ocean City	68	21	44.8	2.37	Turin	58	2	32.5	3.80
Oceanic	66	26	40.2	3.65	Varysburg	71	13	38.2	2.53
Pateron	68	20	43.9	3.85	Wappingers Falls.	59	16	39.0	3.04
Pensauken				3.02	Warwick				3.18
Perth Amboy	62	23	41.0	4.32	Watkins	73	23	42.9	0.77
Plainfield	62	19	41.0	3.75	Wedgwood†	63	15	34.5	1.60
Rancocas				3.32	West Chazy				1.09
Readington**	68 <sup>d</sup>	28 <sup>d</sup>	48.5 <sup>f</sup>		West Point†	65 <sup>b</sup>	17	40.7 <sup>b</sup>	3.69
River Vale† <sup>1</sup>	65	16	40.4	3.47	Willels Point	62	23	41.7	3.00
Salem	64	20	42.0	3.16	<i>North Carolina.</i>				
Somerville	70	17	42.5	3.22	Asheville†	72	13	45.4	3.69
South Orange <sup>1</sup>	60	22	40.8	4.05	Bailey*† <sup>1</sup>	76	20	48.4	2.03
Tenafly†	62	18	39.9	3.63	Bakersville†	73	9	42.6	3.30
Toms River	67	14	41.6	3.05	Blowing Rock†	67	9	41.3	2.21
Trenton	63	22	43.2	3.37	Bryson City†				2.37
Vineland	68	19	43.4	3.75	Chapel Hill†	79	17	48.2	1.54
Whiting	68	20	43.8	2.85	Experiment† Farm	72 <sup>d</sup>	20 <sup>e</sup>	49.2 <sup>e</sup>	2.00
Woodbine	69	16	43.0	2.40	Falkland*†	77	26	52.2	4.37
<i>New Mexico.</i>					Fayetteville†				2.39
Albert†	75	19	45.2	0.00	Flat Rock	72	13	42.9	6.47
Albuquerque†	68	18	41.2	0.17	Goldsboro†	72	21	51.8	2.27
Chama†	71	3	37.8	0.85	Greensboro†	74	20	48.4	1.55
Coolidge†	63	3	31.7	0.35	Henderson† <sup>1</sup>	76	18	47.1	2.07
Deming*	84	34	57.0	0.06	Highlands†	65	8	40.6	3.70
East Las Vegas†	67	9	40.0	0.00	Horse Cove†	71	15	44.7	3.17
Estalina Springs	77	13	38.0 <sup>b</sup>	0.23	Lenoir†	69	13	44.0	2.20
Fort Bayard	73	30	45.4	0.09	Lillington†				1.81
Gallinas Spring†	71	15	43.4	0.00	Littleton†	74	19	46.8	3.68
Halls Peak†	63 <sup>e</sup>	-3 <sup>e</sup>	35.8 <sup>e</sup>	0.20	Louisburg† <sup>1</sup>	71	21	48.0	1.52
La Luz†	75 <sup>a</sup>	24 <sup>a</sup>	48.6 <sup>e</sup>	0.02	Lumberton†	74	24	52.4	2.78
Las Cruces†				0.03	Lynn*† <sup>2</sup>	75		43.5	4.89
Lordsburg**	80	23	49.9	0.00	Marion.	73	15	45.7	5.22
Los Lunas†	63	20	38.9	T.	May*†	70	22	51.2	1.86
Monero†	58	5	31.6	0.55	Mocksville*† <sup>1</sup>	74	18	48.8	1.11
Socorro†	76	21	46.2	T.	Morganton*† <sup>1</sup>	69	16	45.4	3.10
Sulphur Hot Sp'ngs	57	-3	30.0	0.54	Mount Airy† <sup>1</sup>	73	13	44.1	2.00
Taos†	63	8	35.6	T.	Mount Pleasant <sup>1</sup>	74	18	47.3	2.19
Watrous				0.00	Murphy†				1.64
<i>New York.</i>					Newbern†	74	24	51.3	3.50
Addison†	60	20	37.0	1.22	Oak Ridge†	73	16	45.8	1.06
Alfred Center.	58	6	34.5	3.98	Pittsboro	72	18	45.8	1.32
Angelica† <sup>1</sup>	64	7	34.2	2.12	Raleigh*† <sup>1</sup>	76	22	50.5	.....
Arcade†	63	11	34.2	1.95	Rockingham†	73	20	48.2	2.44
Arkwright.	60	20	37.2	.....	Roxboro†	75	18	46.8	1.47
Atlanta				1.27	Rutherford Co.*†	67	16	42.8	3.04
Baldwinsville†	64	12	37.4	2.11	Salisbury†	69	20	48.1	2.37
Bedford				3.78	Saxon†	72	12	44.6	1.76
Binghamton† <sup>1</sup>	63	19	36.6	1.38	Shelby†	72	17	46.4	3.60
Bolivar				1.83	Sloan	75	23	53.2	2.87
Boonville				3.14	Smithfield	75	21	49.2	2.05
Bovine Center.				3.56	Soapstone M't†	75	15	47.1	2.02
Brookport†	63	21	38.7	1.00	Southern Pines†	75	19	50.3	1.40
Brookfield†	61	8	33.9	1.11	Tarboro.	78	20	50.4	3.88
Central Park, N. Y.	60	26	42.9	3.55	Weldon†	76	20	48.5	3.64
Cherry Creek				4.91	Willelton	75	21	49.0	4.74
Cooperstown† <sup>1</sup>	61	12	35.0	2.20	<i>North Dakota.</i>				
Portland	55	20	35.3	1.94	Ashley	64	-19	23.5	0.20
De Kalb Junction.				2.55	Berlin†	68	-21	22.6	0.21
Demster.				3.06	Bottineau	58	-25	17.4	0.35
Dunkirk	63	24	39.6	2.86	Churchs Ferry	57	-22	19.0	0.32
Easton.				1.16	Dickinson†	63	-20	23.5	0.03
Eden Center	59	18	38.8	5.59	Ellendale†	67 <sup>a</sup>	-22	25.4 <sup>b</sup>	0.10
Ellis				1.39	Fargo†	68	-24	20.7	1.00
Factoryville† <sup>1</sup>	63	15	37.2	1.61	Forman†	66	-21	34.4	0.23
Fleming†	65	20	37.6	1.45	Fort Berthold	57	-20	22.7	1.29
Fort Niagara†	68	25	41.4	2.43	Fort Stevenson†	60	-21	22.8	0.91
Friendship†	61	7	34.6	2.12	Fort Yates†	68	-19	27.9	0.28
Geneva†	68	19	38.9	.....	Gallatin†	67	-27	20.5	0.33
Gloversville†	59	11	33.4	1.34	Grafton†	63	-20	20.2	0.40
Hess Road Station†	55	22	39.4	2.86	Grand Forks† <sup>1</sup>	63	-18	21.0	0.20
Honeymead Brook†	57	15	36.9	1.94	Jamestown†	67	-18	26.0	0.25
Lumphey† <sup>1</sup>	55	16	36.8	2.56	Kelso†	68	-26	23.3	0.80
Thaca†	60	19	36.4	1.25	Larimore	70 <sup>b</sup>	-23	17.2 <sup>a</sup>	0.20
Jamestown**	57	12	38.0	.....	McKinney	61	-23	19.7	1.23
Kings Station				1.25	Milton†	64 <sup>d</sup>	-24 <sup>c</sup>	17.3 <sup>c</sup>	0.60
Lebanon Springs.	58	12	35.8	2.00	Minto†	62	-19	33.2	.....
Le Roy	64	20	37.2	1.75	Napoleon†	67	-18	24.6	0.96
Lockport	65	19	38.1	3.34	New Salem	73	-14	26.4	T.
Lowville	62	-3	33.5	3.75	Oakdale†	61	-22	25.0	1.20
Madison Barracks†	67	10	38.6	2.74	Power† <sup>1</sup>	70	-19	23.3	0.53
Malone†	61	6	34.0	1.45	Saint Johns†	59	-22	17.9	1.43
Middletown	56	18	39.3	3.59	Shenylene	74	-20	33.4	1.75
Minnewaska†	53	17	34.4	2.05	Sykeston†	73	-22	20.7	0.05
Mount Morris	64	19	37.4	1.10	Valley City†	65 <sup>e</sup>	-18	24.6 <sup>d</sup>	0.03
Newark Valley				0.75	Wahpeton†	71	-17	26.6	0.12
New Lisbon	63	11	34.6	0.95	Washburn	73	-20	25.8	0.95
North Hammond† <sup>1</sup>	58	14	37.9	2.26	Wild Rice† <sup>2</sup>			20.2	0.62
Numbs Four†	52	-1	32.0	3.60	Williamsport.	63	-19	23.9	0.22
Orfordburg† <sup>1</sup>	65	10	36.6	1.88	Willow City†	58 <sup>d</sup>	-25 <sup>d</sup>	17.4 <sup>d</sup>	1.10
Orford	63	13	35.5	1.72	Woodbridge†	50	-22	16.8	2.10

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<b>Ohio.</b>					<b>Ohio—Cont'd.</b>				
Akron.....	64	15	39.1	1.58	Thurman.....	70	10	44.7	3.71
Annapolis.....	69	10	38.5	1.43	Tiffin.....	65	13	38.9	2.15
Arcanum.....	67	10	38.5	1.90	Upper Sandusky.....	64	10	39.0	2.19
Ashland.....	66	13	38.0	2.22	Vanceburg.....	68	14	42.8	2.21
Athens.....	68	10	36.6	1.72	Van Wert.....	68	8	37.0	2.80
Auburn.....	64	7	35.9	1.82	Vermilion.....	65	13	38.3	1.97
Bangorville.....	65	7	36.1	2.47	Vicksburg.....	65	13	38.1	1.93
Batavia.....	65	9	34.7	2.39	Walnut.....	67	8	38.2	1.61
Bement.....	69	10	38.1	2.10	Warren.....	67	8	38.2	1.17
Benton Ridge.....	64	11	37.2	1.98	Wauseon.....	68	6	36.5	3.88
Bethany.....	65	13	38.0	1.78	Waverly.....	72	8	40.5	2.11
Big Prairie.....	65	13	38.0	1.78	Waynesville.....	65	13	39.6	1.90
Bisnola.....	65	13	38.0	1.96	Westerville.....	65	13	39.6	2.21
Bladensburg.....	64	8	36.8	2.78	Weston.....	66	10	38.0	2.18
Bloomington.....	74	8	38.2	2.32	Wheeler.....	66	15	37.9	3.82
Bowling Green.....	70	7	35.8	2.65	Wooster.....	66	15	37.9	2.49
Bucyrus.....	70	10	37.2	2.16	Wooster.....	68	9	38.1	2.49
Cadiz.....	65	11	37.9	1.54	Zanesville.....	68	9	38.1	2.07
Caledonia.....	65	11	37.9	1.54	<b>Oklahoma Ter.</b>				
Canal Dover.....	67	9	36.9	1.71	Anadarko.....	87	14	46.4	0.63
Canton.....	63	15	38.7	1.75	Burnett.....	84	13	46.3	1.76
Cardington.....	63	15	38.7	1.75	Fort Reno.....	86	17	48.6	0.93
Carrollton.....	66	11	39.2	1.57	Fort Sill.....	85	18	46.4	1.39
Cedarville.....	73	10	42.2	2.02	Fort Supply.....	88	10	41.4	0.70
Celina.....	73	10	42.2	2.02	Kokuk Falls.....	82	15	45.2	1.46
Cherry Fork.....	69	6	40.7	2.87	Mangum.....	89	9	47.6	0.10
Chicago.....	64	3	36.0	1.85	Ponca.....	83	13	41.6	2.81
Circleville.....	67	10	39.7	2.08	<b>Oregon.</b>				
Clarksville.....	67	10	39.7	2.08	Albany.....	61	24	43.7	10.58
Cleveland.....	65	14	39.3	2.13	Albany.....	68	29	44.6	7.30
Coalton.....	74	8	40.3	1.94	Arlington.....	69	19	41.3	1.96
Colebrook.....	67	10	39.2	2.85	Ashland.....	68	18	41.5	3.32
Dayton.....	67	10	40.8	1.63	Ashland.....	67	20	43.4	3.47
Dayton.....	67	10	40.8	1.63	Aurora.....	65	29	49.2	7.99
Demos.....	67	14	40.6	1.94	Aurora (near).....	60	23	44.3	8.89
Dupont.....	67	10	39.2	3.16	Bandon.....	64	33	49.0	14.04
Ellsworth.....	64	9	37.8	1.25	Brownsville.....	62	20	44.8	7.20
Elmira.....	64	15	37.8	2.03	Canyon City.....	67	11	40.0	3.76
Findlay.....	66	16	37.6	2.55	Comstock.....	62	20	44.7	9.63
Frankfort.....	68	16	37.6	2.62	Corvallis.....	60	22	43.6	8.28
Garrettsville.....	64	5	35.8	1.88	Corvallis.....	58	22	42.9	7.91
Granville.....	67	10	37.1	2.36	Corvallis (near).....	61	24	43.8	10.14
Gratiot.....	66	12	39.6	3.03	Crook.....	62	5	38.0	2.15
Green Hill.....	73	10	43.0	1.65	Eugene.....	61	31	48.4	16.53
Green Hill.....	65	9	36.8	1.35	Gardiner.....	58	20	41.2	34.88
Greenville.....	63	9	36.8	2.12	Glenora.....	58	16	43.5	6.10
Guayville.....	68	9	39.4	1.75	Grants Pass.....	70	24	47.0	4.66
Hackney.....	65	10	39.4	1.46	Grants Pass.....	64	19	41.8	2.99
Hanging Rock.....	73	8	41.1	2.87	Heppner.....	57	21	40.1	9.50
Harbor.....	67	13	39.7	3.23	Hood River (near).....	63	22	43.2	7.59
Hillhouse.....	75	3	40.3	4.03	Hubbard.....	60	22	44.4	6.87
Hillboro.....	71	7	40.5	2.93	Jacksonville.....	60	22	44.4	6.87
Hiram.....	67	10	37.1	2.04	Joseph.....	55	6	32.4	2.22
Jacksonboro.....	70	8	38.6	2.04	Junction City.....	68	26	46.0	8.02
Kenton.....	69	9	40.3	3.08	Lafayette.....	66	22	46.7	12.41
Kilbourne.....	65	10	38.8	1.86	La Grande.....	59	17	38.0	3.62
Killbuck.....	64	10	37.1	2.19	Lakeview.....	68	9	34.8	3.68
Leipsic.....	68	9	38.2	3.01	Langlois.....	75	28	51.4	20.42
Levering.....	68	10	37.2	2.31	Leland.....	62	20	45.0	6.07
Logan.....	70	10	41.5	1.75	McMinnville.....	62	23	44.2	11.57
Lordsburg.....	62	8	36.6	1.25	McMinnville.....	62	24	44.6	10.94
Lowell.....	71	10	39.2	1.13	Monmouth.....	62	29	45.2	9.63
McConnellsville.....	73	11	41.4	1.92	Monmouth.....	62	24	44.4	9.40
Mansfield.....	69	18	42.7	2.79	Newbridge.....	61	13	41.4	0.90
Marietta.....	69	18	42.7	2.79	Newport.....	70	32	48.2	14.68
Marietta.....	69	18	42.7	2.79	Oregon City.....	62	37	47.9	11.66
Marion.....	69	7	37.6	1.82	Piedmont.....	62	10	40.1	1.78
Millford.....	69	10	39.0	1.91	Portland.....	68	18	45.4	9.53
Millport.....	65	9	38.4	1.22	Riddle.....	68	18	43.7	4.05
Monmouth.....	64	6	35.6	3.88	Roseburg.....	63	26	47.4	5.01
Monroeville.....	69	10	39.8	2.52	Salem.....	63	24	44.8	7.16
Napoleon.....	68	9	38.7	3.08	Salem.....	61	21	43.4	9.33
Nelsonville.....	68	9	38.7	3.08	Sheridan.....	62	23	45.3	8.38
New Alexandria.....	64	13	40.0	1.44	Silverton.....	66	22	44.0	8.65
New Berlin.....	64	12	37.2	1.13	Siskiyou.....	65	25	43.0	8.10
New Comerstown.....	68	11	38.2	1.94	Sparta.....	65	12	35.8	2.79
New Holland.....	68	8	39.4	2.46	Springfield.....	60	20	44.8	10.16
New Lewisburg.....	64	9	35.4	2.06	The Dalles.....	64	31	41.6	4.36
North Royalton.....	64	11	37.0	1.78	Toledo.....	65	28	48.1	18.89
Northwood.....	70	8	39.1	2.20	Umatilla.....	65	28	48.1	18.89
Oberlin.....	67	13	38.9	2.30	Vale.....	64	26	44.0	15.34
O. S. University.....	69	11	39.3	1.61	Vernonia.....	68	26	45.8	8.52
Orangeville.....	64	3	37.0	1.50	West Fork.....	61	18	39.5	3.20
Plattsburg.....	67	11	38.2	2.37	Weston.....	64	18	43.6	7.25
Portsmouth.....	66	9	38.7	2.41	Williams.....	64	18	43.6	7.25
Ridge.....	61	10	36.6	1.88	<b>Pennsylvania.</b>				
Ridgeville.....	61	8	36.2	3.54	Altoona.....	63	20	44.9	1.48
Ripley.....	68	11	42.2	2.02	Aqueduct.....	59	19	39.4	3.14
Rittman.....	63	9	38.2	2.20	Beaver Dam.....	57	18	34.8	3.95
Rush Creek.....	63	9	38.2	2.20	Blooming Grove.....	57	19	40.0	1.44
Sharon Center.....	67	9	38.2	1.87	Blue Knob.....	58	0	34.6	2.79
Shenandoah.....	67	9	38.2	1.87	Brookville.....	58	0	34.6	2.79
Sidney.....	67	9	38.2	1.87	Browsers Look.....	58	0	34.6	2.79
Spring Valley.....	67	9	38.2	1.87	Carlisle.....	61	15	38.0	3.92
Stoutsville.....	67	9	38.2	1.87	Clarion.....	66	15	39.4	5.69
Sylvania.....	67	10	37.6	2.93	Confluence.....	66	15	39.4	5.69

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<b>Pennsylvania—Con.</b>					<b>S. Carolina—Cont'd.</b>				
Du Bois†	65	10	35.0	2.60	Santuck*1	70	23	49.5	2.50
Dyberry†	65	10	35.0	2.17	Simpsonville†	76	20	51.4	4.93
East Mauch Chunk.	60	15	39.0	3.26	Society Hill†	73	23	51.8	2.16
Easton†	58	18	40.0	3.21	Spartanburg†	78	28	50.0	3.33
Edinboro*1	56	13	35.6	2.05	Statesburg†	74	25	52.5	2.19
Emporium†	63	18	38.1	2.05	Tatum Station*2	74	24	47.2	3.03
F*ka of Neshaminy†	63	18	38.1	2.05	Tillers Ferry†	75	31	57.8	3.20
Frederick.	63	18	38.1	2.05	Timmonsville*†1	75	31	57.8	3.20
Freeport†	63	18	38.1	2.05	Trenton*1	75	30	55.7	1.85
Girardville†	58	23	39.0	3.57	Trials†	77	27	57.3	1.27
Grampan*1	56	23	34.1	1.72	Waterloo†	76	24	50.6	1.96
Greensboro†	62	19	40.5	2.03	Watts*2	76	23	50.7	1.91
Hamburg.	62	19	40.5	2.03	<b>South Dakota.</b>				
Holidaysburg†	65	5	38.1	2.13	Aberdeen†	70	11	27.4	0.50
Honesdale†	58	12	36.8	2.49	Alexandria†	79	5	33.0	0.20
Huntingdon†	64	10	39.6	2.46	Ashcroft†	73	13	28.2	0.55
Johnstown†	63	16	41.1	4.34	Bear Valley*1	65	6	31.2	0.23
Kennett Square	60	19	40.6	3.42	Bowling†	60	10	27.5	0.35
Kilmer*1	60	19	40.6	3.42	Brookings†	73	13	27.1	0.04
Lancaster	65	20	40.2	3.76	Castleton†	73	16	26.2	0.40
Lansdale.	63	18	40.0	3.42	Cross†	66	8	31.3	0.43
Lebanon†	63	18	40.0	3.42	De Smet†	80	10	28.6	0.15
Le Roy†	62	18	36.8	2.07	Faulkton†	69	11	27.8	0.25
Lewisburg	61	16	38.3	1.61	Flandreau†	73	12	28.4	0.22
Lock Haven†	61	16	38.3	1.61	Forestburg†	73	8	29.3	0.20
Lock No. 4†	62	25	43.9	1.35	Forest City†	68	12	32.8	0.08
Lycippus*1	62	25	43.9	1.35	Fort Meade	68	10	34.2	1.48
Mahoning†	62	9	39.9	1.39	Fort Sully	75	4	33.2	0.55
Newcastle†	62	9	39.9	1.39	Frankfort†	70	13	27.8	0.35
Oil City†	62	9	39.9	1.39	Gary†	72	9	27.2	0.50
Ottaville†	62	9	39.9	1.39	Greenwood†1	73	2	32.5	0.64
Parker†	62	9	39.9	1.39	Hitchcock.	73	7	30.6	0.08
Philadelphia†	63	25	44.3	3.81	Howard†	72	10	28.0	0.00
Phoenixville†	63	19	42.1	4.74	Kimball†	75	10	31.6	0.43
Point Pleasant.	63	19	42.1	4.74	Mellette*1	62	6	28.1	0.20
Pottstown.	63	21	42.4	4.78	Millbank*1	75	10	30.4	0.33
Quakertown†	62	15	39.3	4.44	Northville*1	67	10	25.7	0.27
Reading†2	62	15	39.3	4.44	Oelrichs†	84	14	33.4	0.95
Ridgway†	65	4	36.4	3.04	Parker†	72	6	29.2	0.25
Saegertown.	56	18	34.0	2.74	Parkston†	74	13	30.3	0.32
Salem Corners†1	65	4	36.4	3.04	Piedmont.	74	8	33.4	0.20
Saltsburg†	56	18	34.0	2.74	Rosebud†	71	9	30.2	0.45
Seisholtzville.	65	4	36.4	3.04	Sioux Falls†	71	9	30.2	0.45
Selins Grove.	60	12	34.7	2.26	Spearfish†1	70	10	33.8	1.00
Shinglehouse.	62	20	41.5	4.21	Tyndall†	75	0	33.0	0.80
Skippack†	62	20	41.5	4.21	Vermillion†	80	10	33.2	0.30
Smithport.	62	20	41.5	4.21	Watertown†	72	15	28.6	0.65
Smiths Corners.	62	20	41.5	4.21	Webster†1	80	24	28.4	0.62
Somerset†	63	6	35.9	1.16	Westworth†1.	74	14	22.5	0.19
South Eaton.	62	20	36.8	1.94	Wessington Spgs†	80	5	33.8	0.50
State College†	59	13	37.7	3.04	Whitehood.	80	5	33.8	0.50
Stoyestown†.	61	20	41.9	4.04	Wolsey*†1	73	7	27.1	0.35
Swarthmore.	61	20	41.9	4.04	<b>Tennessee.</b>				
Uniontown†	65	15	41.5	2.34	Andersonville*1.	63	13	39.6	2.20
Warren†.	65	15	41.5	2.34	Arlington†	76	20	46.6	3.85
Wellboro*†1.	60	18	33.5	3.60	Ashwood*†1.	72	30	47.3	2.80
West Chester.	60	21	41.6	4.00	Bolivar†.	73	16	46.6	4.50
West Newton†	62	18	39.1	1.27	Brownsville†.	77	24	49.7	2.77
Westtown.	62	18	39.1	1.27	Byrdstown*†2.	71	16	46.2	2.77
Wilkesbarre†	63	17	40.5	3.55	Carthage†.	71	16	46.2	2.77
York†.	63	17	40.5	3.55	Charleston†.	71	16	46.2	2.77
<b>Rhode Island.</b>					Clarksville†	75	17	47.1	3.64
Bristol†.	62	18	42.0	2.70	Clinton†.	71	16	46.2	2.77
Kingston†.	67	15	39.4	3.37	Columbia†.	71	16	46.2	2.77
Lonsdale.	67	15	39.4	3.37	Covington†.	76	22	48.8	4.41
Newport.	64	22	44.6	2.52	Covington†.	77	26	50.8	4.34
Pawtucket†.	65	14	40.7	2.52	Dyersburg†.	76	19	46.9	4.36
Providence a.	66	18	41.6	2.72	Florence Station*1	72	21	46.8	1.83
Providence c.	66	15	40.3	3.87	Franklin†.	73	14	45.5	2.51
<b>South Carolina.</b>					Greenville*1.	69	16	45.0	1.56
Aiken†.	72	25	53.6	2.12	Harriman*1.	75	13	44.3	2.80
Allendale†.	80	27	55.1	1.52	Jacksonboro*1.	62	13	42.8	1.73
Anderson†.	76	26	52.1	2.65	Jackson†.	74	20	45.8	3.75
Datesburg†.	76	26	52.1	2.65	Johnsonville†.	71	16	46.2	2.77
Blackburg†.	79	27	53.0	1.70	Kingston†.	71	16	46.2	2.77
Blackville†.	79	27	53.0	1.70	Landon†.	71	16	46.2	2.77
Stenheim*2.	79	27	53.0	1.70	Lynnvill*1.	75	19	47.2	2.32
Sewer Mine†.	76	20	49.8	4.40	Milan†.	70	19	45.3	4.59
Madison†.	76	20	49.8	4.40	Missionary Ridge*2.	70	19	45.3	4.59
Central†.	73	22	51.1	2.62	Newport*1.	74	12	43.1	3.81
Charaw*1.	73	22	51.1	2.62	Nunnely*1.	74	15	47.3	3.08
Theraw*1.	73	22	51.1	2.62	Palmetto†.	75	19	50.0	1.25
Theraw*1.	73	22	51.1	2.62	Parksville*1.	71	16	47.1	1.90
Thomson College†.	70	28	53.9	1.33	Riddletton†.	75	15	48.9	2.45
Tonnors*1.	70	28	53.9	1.33	Rockwood†.	66	16	44.4	2.01
Cross Hill*1.	74	25	50.5	3.46	Rogersville*1.	67	12	43.0	1.85
Gillingham†.	76	21	50.2	1.20	Rugby*1.	76	19	49.0	3.13
Hint Hill†.	76	21	50.2	1.20	Savannah*1.	75	19	49.0	3.13
Florence†.	78	27	53.3	2.63	Strawberry Plains†.	75	20	46.1	4.90
Georgetown†.	80	28	57.6	0.86	Trenton.	72	12	44.9	3.50
Greenville†.	75	15	48.9	1.90	Wier*†1.	70	12	45.2	2.54
Greenwood†.	74	24	52.3	2.86	<b>Texas.</b>				
Hardeeville†.	77	27	57.0	1.26	Arlington†.	87	24	54.1	2.90
Lollands Store†.	77	16	49.6	2.04	Arthur City†.	86	26	52.3	1.88
Kingstree†.	79	27	57.0	1.26	Austin*1.	86	26	52.3	1.88
Little Mountain*1.	78	36	56.9	1.47	Austin*2.	82	32	56.6	4.90
McCollum†.	75	24	52.3	2.86	Belton†.	85	28	56.2	3.67
McCormick†1.	74	24	52.3	2.86	Boerne*†2.	85	28	56.2	3.67
McCormick†1.	74	24	52.3	2.86	Brady†.	85	26	51.3	1.55
McCormick†1.	74	24	52.3	2.86	Brasoria†1.	85	31	61.1	3.84
McCormick†1.	74	24	52.3	2.86					



## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>Texas—Cont'd.</i>	0	0	0	<i>Ins.</i>	<i>Vermont—Cont'd.</i>	0	0	0	<i>Ins.</i>
Brenham†.....	85	30	59.6	10.47	Vernon*.....	56	8	33.0	1.62
Brownwood†.....	85	25	50.4	1.62	Wells.....	55	8	33.9	1.38
Camp Eagle Pass.....	89	25	57.6	0.19	Woodstock.....	59	3	33.1	1.57
Childress†.....	84	18	45.0	T.	<i>Virginia.</i>				
Coldwater†.....	83	20	56.8	1.38	Abingdon†.....	67	20	43.4	1.76
College Station.....	83	20	56.8	5.59	Alexandria†.....	75	14	45.7	2.71
Columbia†.....	86	30	61.6	2.83	Ashland†.....	80	8	46.0	2.34
Corsicana†.....	87	24	55.3	3.72	Avon†.....	70	14	46.8	1.50
Corsicana†.....	82	22	51.4	4.29	Bedford City†.....	67	8	39.6	3.15
Cuero†.....	87	32	61.2	4.51	Big Stone Gap†.....	76	25	49.2	7.13
Dallas†.....	84	23	51.1	3.30	Birdsboro†.....	66	10	41.6	0.73
Dallas†.....	86	31	57.4	3.50	Blacksburg†.....	77	24	48.3	8.11
Devine.....	88	30	59.6	4.20	Buchanan†.....	73	14	44.9	2.52
Duval†.....	83	20	56.8	0.06	Cape Charles†.....	73	14	44.9	2.52
Eagle Pass†.....	76	32	51.0	2.13	Charlottesville.....	73	14	44.9	2.52
Eastland†.....	84	35	64.3	1.29	Christiansburg†.....	73	14	44.9	2.52
Flower Bluff†.....	84	35	64.3	1.29	Clarksville†.....	73	14	44.9	2.52
Forestburg†.....	84	35	64.3	1.29	Dale Enterprise†.....	67	10	39.7	2.40
Fort Brown†.....	89	44	63.8	2.53	Danville†.....	73	14	44.9	2.52
Fort Clark.....	86	30	58.2	0.28	Falls Church†.....	73	14	44.9	2.52
Fort Hancock.....	85	14	43.6	0.00	Fredericksburg†.....	73	14	44.9	2.52
Fort McIntosh.....	86	35	61.6	0.20	Hampton.....	72	23	49.6	6.34
Fort Ringgold†.....	89	34	62.8	0.22	Hot Springs.....	70	11	40.9	2.08
Fredericksburg†.....	84	27	52.1	3.99	Irwin†.....	70	16	45.1	3.50
Gainesville†.....	83	19	47.0	2.09	Lexington†.....	72	10	41.2	1.90
Graham†.....	86	22	50.4	1.48	Marion†.....	66	11	43.0	1.79
Grape Vine†.....	85	21	53.4	4.56	Nottoway.....	77	13	45.4	3.42
Hallettsville†.....	86	33	58.8	4.56	Petersburg†.....	78	19	48.5	4.06
Hartley†.....	72	9	41.8	0.00	Richmond†.....	76	15	47.3	3.05
Hearne†.....	88	28	55.1	5.33	Richmond†.....	76	15	47.3	3.05
Highland.....	86	20	51.3	2.39	Riverton†.....	76	15	47.3	3.05
Houston†.....	83	32	59.0	4.96	Salem†.....	69	18	45.7	1.66
Huntsville†.....	92	32	56.8	5.60	Saluda†.....	78	20	48.2	6.42
Kent.....	83	27	50.4	0.96	Spottsville†.....	73	18	46.3	6.52
Laredo†.....	84	26	54.6	3.02	Stannardsville†.....	73	18	46.3	6.52
Llano†.....	84	29	55.4	0.42	Staunton†.....	68	12	41.6	2.06
Longview†.....	86	32	56.8	3.06	Stephens City†.....	65	20	41.5	2.25
Luling†.....	86	32	56.8	3.06	Warsaw†.....	73	19	45.5	3.42
McGregor†.....	75	26	44.2	3.86	Woodstock†.....	73	19	45.5	3.42
Marshall†.....	82	27	54.2	9.55	Wytheville†.....	63	13	41.2	1.70
Menardville†.....	88	28	49.5	0.62	<i>Washington.</i>				
Mesquite†.....	85	23	51.1	3.70	Aberdeen†.....	64	27	43.4	14.37
Mountain Spring†.....	85	23	51.4	2.37	Anacortes.....	52	20	38.0	8.11
New Braunfels†.....	84	33	56.8	3.35	Blaine†.....	52	20	38.0	8.11
Orange†.....	82	28	50.8	0.06	Bridgeport†.....	65	9	33.2	1.51
Panther†.....	84	24	51.6	2.73	Chehalis†.....	59	23	41.9	9.80
Paris†.....	82	24	53.2	4.23	Colfax†.....	59	20	36.2	3.96
Rio Grande City†.....	86	21	47.4	0.55	Crystal Springs*.....	58	36	46.1	.....
Roby†.....	80	40	63.9	.....	Davenport†.....	64	2	33.4	1.30
Rockport*.....	80	40	63.9	.....	Dayton†.....	61	20	39.1	4.45
Round Rock†.....	88	34	58.4	1.31	East Sound†.....	53	29	41.1	7.30
San Marcos†.....	80	24	53.4	4.73	Elbe.....	59	9	33.6	1.65
Sherman†.....	80	24	53.4	2.70	Ellensburg†.....	58	22	43.0	13.65
Silver Falls†.....	85	19	49.1	0.10	Ferry†.....	66	20	38.0	2.59
Stella*.....	87	30	62.1	4.48	Fort Simcoe.....	57	2	32.5	3.01
Sulphur Springs†.....	86	22	51.4	6.22	Fort Spokane.....	55	25	40.1	5.31
Temple†.....	82	26	53.4	4.00	Fort Townsend†.....	57	17	34.6	2.38
Tyler†.....	82	26	53.4	4.75	Lakeside†.....	58	26	41.3	9.24
Victoria†.....	82	26	53.4	3.20	Madrone†.....	58	26	41.3	9.24
Waco†.....	84	27	55.0	3.36	Moxee Valley†.....	66	10	35.6	2.00
Weatherford†.....	82	24	51.9	3.02	Olga†.....	53	25	41.0	6.12
Wichita Falls†.....	98	.....	.....	0.20	Pine Hill*.....	60	19	39.5	6.03
<i>Utah.</i>					Pomeroy†.....	60	22	40.4	3.40
Blue Creek*.....	66	10	35.2	0.15	Pullman†.....	55	19	35.0	3.53
Castle Gate†.....	59	10	35.1	0.37	Rosalia†.....	54	15	33.8	3.53
Cisco†.....	67	10	34.7	1.11	Silver Creek*.....	59	22	42.4	11.84
Corinne*.....	72	15	38.0	1.24	Tacoma†.....	57	24	41.1	9.93
Fillmore†.....	86	3	38.9	1.11	Union City†.....	52	26	39.8	13.05
Fort Du Chene†.....	62	1	32.9	0.24	Vashon†.....	60	17	36.7	7.15
Green River†.....	67	9	34.0	0.20	Waterville†.....	55	1	29.7	2.53
Grouse Creek†.....	68	6	29.8	1.60	West Ferndale.....	52	20	37.8	8.30
Heber†.....	68	3	32.6	1.60	<i>West Virginia.</i>				
Kelton*.....	56	5	35.7	0.56	Bluefield†.....	66	9	42.6	1.93
Koonsham.....	56	3	35.7	0.56	Buckhannon†.....	64	10	40.0	2.31
Lake Park.....	60	13	37.2	1.36	Buckhannon†.....	64	10	40.0	2.31
Levan†.....	59	8	35.6	0.98	Central Station†.....	66	10	41.4	2.62
Lon†.....	59	8	35.6	0.98	Charleston†.....	62	16	40.4	2.41
Logan†.....	62	10	35.8	0.92	Charlestown.....	62	16	40.4	2.41
Loose†.....	61	12	35.5	0.40	Elkhorn†.....	67	11	44.4	1.68
Moab†.....	70	15	36.8	1.46	Ella†.....	64	14	40.4	1.86
Mount Carmel†.....	61	11	35.3	0.25	Fairmont†.....	64	14	40.4	1.86
Ogden*.....	63	24	40.0	1.45	Glenville†.....	67	11	41.8	3.22
Ogden*.....	65	21	39.0	1.26	Grafton†.....	67	10	41.4	2.59
Parowan†.....	64	8	36.2	1.38	Harpers Ferry†.....	67	10	41.4	2.59
Promontory*.....	64	0	35.7	1.40	Hinton†.....	67	10	41.4	2.59
Provo City†.....	64	0	35.7	1.40	Marlinton†.....	64	3	38.0	1.99
Randolph†.....	64	-13	29.4	0.02	Martinsburg†.....	62	16	39.6	2.98
Richfield†.....	63	7	35.5	0.02	Morgantown†.....	72	15	40.3	2.38
Saint George†.....	76	17	45.2	0.05	Morgantown†.....	72	15	40.3	2.38
Seefield†.....	61	-16	25.4	0.22	New Martinsville†.....	70	11	42.7	1.80
Singletree†.....	60	3	33.1	0.75	Nuttallburg†.....	72	11	48.1	2.19
Snowville†.....	59	3	32.7	1.38	Parkersburg†.....	64	12	41.5	2.07
Soldier Summit†.....	54	1	25.4	0.71	Philippi†.....	64	12	41.5	2.07
Terrace*.....	56	10	37.1	0.70	Pleasant Hill†.....	70	8	36.9	3.10
Thistle†.....	54	10	37.1	1.06	Point Pleasant†.....	74	14	42.4	2.26
<i>Vermont.</i>					Rowlesburg†.....	68	7	40.3	1.80
Brattleboro.....	61	8	36.6	1.89	Sandyville†.....	68	7	40.3	1.80
Burlington†.....	57	14	39.0	1.41	Spencer†.....	74	9	46.1	0.30
Cornwall.....	57	14	39.0	1.41	Weston†.....	68	13	41.6	2.70
Enosburg Falls†.....	58	9	34.5	1.76	Weston†.....	68	13	41.6	2.70
Hartland†.....	58	4	32.4	2.31	Wheeling†.....	66	16	43.6	1.70
Irasburg†.....	57	2	31.0	2.17	<i>Wisconsin.</i>				
Jacksonville.....	58	1	30.0	2.01	Amherst.....	69	-15	29.8	1.66
Norwich*.....	51	5	31.1	1.55	Baraboo†.....	68	-7	33.8	1.28
Simonville.....	52	0	29.6	.....					
Stratford†.....	54	9	33.7	1.75					

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>Wisconsin—Cont'd.</i>					<i>Wisconsin—Cont'd.</i>				
Bayfield.....	59	4	29.0	1.49	Pepin.....	71	-16	28.6	1.18
Beaver Dam.....	67	-2	32.6	1.40	Portage†.....	79	-8	33.0	2.14
Belleville.....	68	-4	31.9	1.41	Prairie du Chien...	79	-8	33.0	1.18
Beloit†.....	67	-4	33.3	1.96	Raymond.....	67	0	33.0	2.20
Black River Falls†.....	74	-15	30.6	1.92	Reedsburg†.....	67	-10	33.4	1.36
Butternut†.....	62	-21	26.0	0.70	Sharon†.....	70	-13	32.1	2.35
Cadiz*.....	68	-10	29.4	0.84	Sparta†.....	73	-12	30.9	0.69
Centralia.....	73	-14	29.0	0.80	Stevens Point†.....	68	-17	31.6	1.31
Chippewa Falls†.....	68	-16	30.4	1.23	Valley Junction†.....	72	-17	31.0	1.38
City Point.....	68	-16	30.4	1.25	Viroqua.....	67	-10	31.2	0.87
Columbus.....	70	-5	33.1	1.80	Watertown†.....	65	-12	32.4	1.03
Crandon†.....	66	-15	29.0	1.17	Waukesha*†.....	65	-10	31.2	1.47
Delavan (near)†.....	69	-5	33.5	1.17	Westfield†.....	65	-10	31.2	1.47
Eau Claire.....	67	-11	30.2	1.30	Weston*†.....	68	-10	28.0	1.35
Estella†.....	67	-11	30.2	1.40	Whitehall†.....	76	-11	34.1	1.20
Florence†.....	68	-4	28.0	1.54	<i>Wyoming.</i>				
Fond du Lac†.....	67	-8	32.3	1.66	Big Horn Ranch†.....	54	-13	26.7	1.17
Grantsburg†.....	75	-15	30.6	0.90	Camp Pilot Butte...	60	-6	30.9	1.00
Harvey†.....	65	-2	32.0	0.80	Fort McKinney.....	69	-11	33.0	0.72
Hayward†.....	67	-20	27.1	0.65	Fort Washakie.....	61	-14	27.3	1.40
Hillsboro.....	70	-11	30.6	1.10	Fort Yellowstone†.....	46	.....	.....	2.51
Janesville.....	69	0	32.8	0.86	Laramie.....	57	-6	29.2	0.65
Koepnick*†.....	80	-12	34.6	2.25	Saratoga†.....	58	-13	26.8	0.70
Lancaster†.....	68	-7	31.6	1.20	Sheridan.....	64	-17	26.8	1.40
Lincoln†.....	66	-10	35.4	1.29	Sundance.....	61	-13	27.6	0.50
Madison†.....	65	0	32.6	1.30	Wheatland†.....	70	1	32.6	0.30
Manitowoc†.....	66	0	32.1	1.68	<i>Canada.</i>				
Medford†.....	65	-18	28.3	0.90	Fort Francis, Ont..	70	-22	22.1	1.17
Medford†.....	65	-18	28.3	0.90	<i>Mexico.</i>				
Menomonie†.....	70	-18	26.7	0.77	Leon de Aldamas†.....	77	40	60.5	0.16
Neillsville†.....	66	-14	29.5	1.59	Mazatlan.....	84	60	72.0	T.
New Holstein†.....	66	0	35.3	2.00	Mexico.....	80	37	58.2	0.14
Oconomowoc†.....	67	-1	34.9	1.34	Puebla.....	73	44	59.0	2.80
Oconto.....	64	0	33.4	1.34	<i>New Brunswick.</i>				
Onesla†.....	70	-24	29.3	0.79	Saint John.....	54	13	36.4	2.03

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston*a*," "Livingston*b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small Roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "a" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

Corrections: California, Tulare *b*, October, 1893, make precipitation T, instead of 0.00. Ohio, Athens, August, 1893, strike out all data. Tennessee, Ashwood, June, 1893, make maximum temperature 87 instead of 77. Texas, Menardville, April, 1893, make maximum temperature 99 instead of 69. Utah, Scofield, February, 1893, make minimum temperature -32 instead of 32.

NOTE.—The following changes have been made in names of stations: Colorado, Table Rock, changed to Divide Experimental Station. North Dakota, Joslyn, changed to McKinney. Washington, Chelan, changed to Lakeside.

*Data from Canadian stations for the month of November, 1893.*

Station.	Pressure.			Temperature.		Precipitation.		Prevailing direction of wind.
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Total.	Departure from normal.	
	Inches.	Inches.	Inches.	°	°	Inches.	Inches.	
Saint John's, N. F. ....	29.80	29.95	+ .02	37.8	+ 0.8	8.37	.....	ne.
Sydney, N. S. ....	29.92	29.98	+ .02	38.6	+ 1.1	4.99	- 0.62	sw.
Grindstone, G. S. L. ....	29.88	29.91	.....	36.5	.....	2.73	.....	w.
Sandy Point, N. F. ....	.....	.....	.....	.....	.....	.....	.....	.....
Halifax, N. S. ....	29.90	30.03	+ .03	37.8	- 0.2	3.63	- 1.59	n.
Grand Manan, N. B. ....	29.97	30.02	.....	30.0	.....	2.29	- 1.04	w.
Yarmouth, N. S. ....	29.96	30.04	.00	39.2	- 0.8	2.21	- 0.73	nw.
Saint Andrews, N. B. ....	29.94	29.99	.....	36.2	.....	1.67	- 1.53	nw.
Charlottetown, P. E. I. ..	29.94	29.96	.....	36.4	.....	3.08	- 0.73	w.

*Data from Canadian stations—Continued.*

Station.	Pressure.			Temperature.		Precipitation.		Prevailing direction of wind.
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Total.	Departure from normal.	
	Inches.	Inches.	Inches.	°	°	Inches.	Inches.	
Chatham, N. B. ....	29.96	29.98	.00	30.6	+ 0.1	1.81	- 1.61	w.
Father Point, Que. ....	29.92	29.95	- .01	30.4	+ 1.4	0.98	- 1.48	w.
Quebec, Que. ....	29.66	30.00	- .01	30.7	+ 1.7	2.58	- 1.44	w.
Montreal, Que. ....	29.78	30.00	- .02	34.0	+ 1.5	1.97	- 1.20	sw.
Rockcliffe, Ont. ....	29.42	29.95	- .05	28.6	+ 0.4	1.80	- 0.85	se.
Kingston, Ont. ....	29.70	30.02	- .02	36.4	+ 0.9	2.91	- 0.51	sw.
Toronto, Ont. ....	29.62	30.01	- .04	36.2	- 0.3	2.99	+ 0.04	sw.
White River, Ont. ....	28.54	29.96	.....	21.4	.....	3.39	.....	s.
Port Stanley, Ont. ....	29.38	30.03	- .02	37.0	.....	3.65	+ 0.50	w.
Saugeen, Ont. ....	29.24	29.97	- .03	35.8	+ 0.3	2.38	- 1.52	w.
Parry Sound, Ont. ....	29.24	29.96	- .06	33.4	+ 1.4	5.56	+ 1.35	e.
Port Arthur, Ont. ....	29.18	29.92	- .09	24.2	+ 0.3	0.51	- 1.47	w.
Winnipeg, Man. ....	29.12	30.01	- .06	14.0	- 4.0	2.34	+ 1.35	nw.
Minnedosa, Man. ....	28.08	29.99	- .05	14.4	- 2.1	1.17	+ 0.37	nw.
Qu'Appelle, Assiniboia. .	27.64	30.03	.00	13.8	- 5.7	0.87	+ 0.20	nw.
Medicine Hat, Assiniboia	27.64	30.06	+ .02	19.6	- 7.4	1.23	+ 0.90	s.
Swift Current, Assiniboia	27.35	30.08	+ .02	16.6	- 5.4	0.70	+ 0.19	w.
Calgary, Alberta. ....	26.35	30.08	+ .02	17.9	- 8.1	1.20	+ 0.85	n.
Prince Albert, Sask. ....	28.40	30.02	.....	11.1	.....	0.07	.....	e.
Edmonton, Alberta. ....	27.60	30.06	+ .08	17.6	- 9.4	0.32	+ 0.10	n.
Battleford, Saskatchewan.	28.20	30.04	.....	13.4	.....	0.28	.....	nw.
Spences Bridge, B. C. ....	29.23	30.09	.....	29.4	.....	1.86	.....	e.
Sable Island. ....	.....	.....	.....	.....	.....	.....	.....	.....
Hamilton, Bermuda. ....	29.95	30.11	+ .06	67.1	.....	5.27	.....	ne.
October, 1893.	.....	.....	.....	.....	.....	.....	.....	.....
Edmonton, Alberta. ....	27.56	29.96	.00	32.8	- 7.2	0.04	- 0.43	nw.
September, 1893.	.....	.....	.....	.....	.....	.....	.....	.....
Sable Island. ....	29.92	.....	.....	57.8	.....	4.92	.....	w.



## Climatological data for November, 1893—Weather Bureau Stations.

Districts and stations.	Elevation above sea-level, feet.	Length of record, years.	Pressure, in inches.		Temperature of the air, in degrees Fahrenheit.					Humidity and precipitation.					Wind.		Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.		Mean temperature data since opening of station.											
			Mean pressure, 8 a. m. and 8 p. m. + 2.	Mean reduced.	Departure from normal.	Mean max. and min. + 2.	Departure from normal.	Maximum.	Date.	Mean minimum.	Greatest daily range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal.	Days with .01 or more.			Total movement, miles.	Prevailing direction.	Miles per hour.	Direction.	Date.	Clear days.	Highest for month.	Year.	Lowest for month.	Year.				
New England.																																
Eastport.....	76	21	29.94	30.02	+.05	41.2	0.0	60	3	43	12	27	32	23	29	72	2.11	1.9	8	8,234	sw.	52	se.	22	9	14	7	5.7	39.8	1889	29.0	1873
Portland.....	103	22	29.94	30.05	+.04	38.5	0.7	58	2	46	15	27	31	23	30	73	1.83	2.4	6	5,462	sw.	36	se.	22	10	12	8	4.7	43.2	1877	28.9	1873
Northfield.....	872	7	29.10	30.07	+.03	32.8	0.2	60	2	42	2	27	24	32	35	75	1.95	1.1	10	5,202	sw.	36	n.	22	6	4	9	7.7	35.8	1889	31.0	1890
Boston.....	125	24	29.95	30.09	+.06	42.2	0.5	64	3	49	20	27	35	27	31	69	1.83	2.9	6	8,124	sw.	39	se.	28	13	9	13	5.3	44.6	1889	32.8	1873
Nantucket.....	14	8	30.08	30.10	+.04	43.6	1.0	64	3	49	27	27	39	21	36	74	1.31	2.2	8	8,725	nw.	40	se.	9	11	7	12	6.2	47.1	1888	43.1	1893
Woods Holl.....	16	8	30.08	30.10	+.04	43.9	0.6	63	3	49	24	27	38	20	35	74	2.94	2.2	6	12,224	nw.	48	sw.	17	11	10	9	5.4	46.9	1881	43.0	1873
Vineyard Haven.....	8	8	30.08	30.11	+.05	45.2	0.6	72	3	52	23	27	39	24	38	77	2.52	0.7	7	12,224	nw.	48	sw.	17	11	10	9	5.4	46.9	1881	43.0	1873
Block Island.....	47	14	30.08	30.11	+.05	44.8	0.9	62	3	50	27	26	39	19	38	77	2.16	1.8	6	12,566	nw.	50	se.	10	9	15	6	5.0	47.8	1881	42.7	1882
Narragansett Pier.....	12	12	30.08	30.11	+.05	44.4	1.6	63	3	50	27	26	34	35	38	77	2.72	1.2	6	13,566	sw.	50	se.	10	9	15	6	5.0	47.8	1881	42.7	1882
New Haven.....	107	21	29.98	30.10	+.03	41.0	0.9	59	3	48	19	27	34	28	32	73	2.56	1.4	9	6,587	sw.	45	se.	28	9	13	8	5.4	45.3	1877	33.1	1873
New London.....	45	23	30.07	30.12	+.06	41.8	1.2	64	3	49	21	27	35	27	34	76	2.42	1.7	7	5,903	w.	46	se.	28	11	11	8	5.3	45.8	1889	33.7	1873
Mid. Atlantic States.																																
Albany.....	85	20	30.01	30.10	+.03	38.7	1.9	58	2	46	16	27	31	25	31	78	0.91	0.2	6	5,360	sw.	38	se.	28	3	16	11	6.4	44.0	1883	31.8	1875
New York, N. Y.....	185	24	29.94	30.12	+.04	44.2	1.5	62	3	50	26	26	38	21	34	72	3.71	0.0	9	7,769	sw.	41	se.	9	12	9	11	5.4	48.3	1870	37.3	1873
Harrisburg.....	377	6	29.72	30.15	+.03	40.4	0.9	59	9	47	21	27	34	26	33	79	2.54	1.1	10	4,836	w.	36	sw.	15	10	9	11	5.2	43.6	1888	30.1	1893
Philadelphia.....	117	23	30.01	30.14	+.03	44.0	2.2	62	2	50	24	26	38	24	34	71	2.51	0.7	8	7,552	nw.	36	se.	28	8	14	8	5.6	48.0	1877	38.0	1873
Atlantic City.....	53	20	30.08	30.13	+.03	45.0	0.9	65	18	51	20	26	39	27	39	80	2.19	1.3	8	9,014	nw.	40	se.	28	7	8	15	6.4	48.8	1881	40.5	1875
New Brunswick.....	179	23	29.94	30.14	+.02	43.6	3.5	62	18	50	23	26	37	26	34	73	3.78	0.6	11	5,422	n.	32	se.	27	15	6	9	4.8	49.1	1881	40.6	1873
Washington, D. C.....	112	24	30.03	30.15	+.02	43.6	2.8	66	18	52	21	26	35	35	34	74	4.39	1.4	11	4,818	nw.	28	nw.	24	13	6	11	5.0	48.0	1890	40.2	1880
Cape Henry.....	20	20	30.08	30.11	+.01	43.6	1.6	63	4	57	30	25	44	25	34	74	7.43	3.5	8	9,014	nw.	28	nw.	24	13	6	11	5.0	48.0	1890	40.2	1880
Lynchburg.....	685	23	29.42	30.18	+.04	45.2	3.0	75	4	55	16	26	35	34	35	75	1.41	1.7	8	3,210	ne.	25	nw.	24	14	7	9	5.0	51.4	1890	40.8	1872
Norfolk.....	57	23	30.07	30.14	+.02	45.0	1.2	74	4	57	25	25	44	27	43	81	6.75	1.7	11	6,903	ne.	34	ne.	24	10	10	10	5.6	55.0	1881	46.0	1872
S. Atlantic States.																																
Charlotte.....	773	16	29.31	30.14	+.00	48.9	2.5	74	3	58	21	25	40	30	37	71	2.44	0.8	8	5,101	sw.	24	se.	29	14	7	9	4.5	55.4	1890	45.1	1880
Hatteras.....	11	13	30.10	30.11	+.01	55.8	0.4	71	2	48	33	25	51	26	51	84	8.32	3.2	12	11,095	ne.	49	nw.	8	11	8	11	5.9	59.9	1881	52.3	1882
Kittyhawk.....	9	19	30.08	30.09	+.01	53.0	0.7	72	4	58	20	25	48	22	47	81	2.46	2.0	12	12,628	ne.	49	ne.	8	13	4	13	5.4	57.9	1888	50.1	1892
Raleigh.....	388	7	29.72	30.15	+.02	48.8	1.0	74	3	58	20	25	40	33	39	75	1.97	0.2	11	5,260	n.	28	n.	8	12	6	12	5.3	53.8	1890	46.2	1887
Southport.....	34	19	30.08	30.11	+.01	54.4	0.0	70	3	52	24	25	47	25	51	75	2.00	1.0	11	7,199	ne.	40	sw.	27	11	6	10	4.8	58.0	1881	51.0	1882
Wilmington.....	78	23	30.04	30.13	+.00	55.2	1.0	76	3	63	26	25	47	30	47	82	1.71	0.9	13	6,476	ne.	40	ne.	8	12	8	10	4.8	58.7	1881	51.2	1872
Charleston.....	52	23	30.09	30.14	+.01	57.8	1.1	78	4	65	33	25	50	33	48	77	1.36	1.9	13	5,877	n.	38	se.	27	10	15	5	4.6	62.2	1890	53.5	1880
Columbia.....	7	7	29.95	30.19	+.03	53.5	1.4	80	5	63	25	25	44	34	43	76	1.72	0.5	8	4,129	n.	24	nw.	24	13	11	6	4.4	58.8	1890	52.1	1872
Augusta.....	209	22	29.95	30.19	+.03	53.4	2.0	78	5	64	28	25	44	34	43	76	1.98	1.4	8	4,129	n.	24	nw.	24	13	11	6	4.4	58.8	1890	52.1	1872
Savannah.....	98	23	30.04	30.15	+.00	57.8	1.4	80	4	66	31	25	50	38	50	81	2.31	0.8	7	5,928	nw.	32	nw.	24	8	16	6	5.2	61.5	1890	53.3	1872
Jacksonville.....	43	23	30.08	30.13	+.01	62.0	1.3	84	5	71	31	25	53	32	54	82	1.76	0.5	7	4,800	n.	31	se.	27	9	8	13	6.0	65.6	1890	56.5	1872
Florida Peninsula.																																
Jupiter.....	28	6	30.05	30.08	+.03	72.5	0.4	85	23	78	51	25	67	21	67	87	5.01	0.0	7	7,520	nw.	33	se.	27	15	14	1	3.9	73.7	1890	69.1	1892
Key West.....	22	24	30.06	30.08	+.02	74.6	0.4	83	21	78	64	25	71	12	68	80	0.48	2.1	7	7,405	ne.	34	nw.	27	12	12	6	4.7	78.5	1880	71.6	1885
Mico.....	22	24	30.06	30.08	+.02	74.6	0.4	83	21	78	64	25	71	12	68	80	0.48	2.1	7	7,405	ne.	34	nw.	27	12	12	6	4.7	78.5	1880	71.6	1885
Tampa.....	36	23	30.07	30.11	+.01	67.2	1.1	85	4	76	40	25	58	30	60	85	2.73	0.0	11	4,403	ne.	27	se.	27	7	17	6	5.3	69.0	1890	63.0	1892
Titusville.....	44	7	30.07	30.11	+.01	66.4	1.1	83	22	74	43	16	59	26	60	85	2.88	0.1	11	5,520	nw.	27	nw.	27	11	16	3	4.6	69.0	1890	63.0	1892
Eastern Gulf States.																																
Atlanta.....	1,131	16	28.96	30.18	+.01	50.8	1.6	74	3	59	21	25	43	28	39	70	1.11	0.9	7	7,468	ne.	36	se.	27	15	3	12	4.9	57.6	1890	47.7	1880
Pensacola.....	56	15	30.05	30.12	+.01	59.6	0.8	78	4	68	32	24	51	28	50	76	2.53	1.9	7	5,540	ne.	36	se.	27	15	7	8	4.3	62.8	1890	56.3	1880
Mobile.....	57	23	30.07	30.14	+.00	57.7	1.0	77	21	67	32	24	49	30	50	85	3.54	0.6	7	5,352	n.	37	se.	27	8	10	13	5.5	62.2	1875	54.0	1880
Montgomery.....	257	23	29.86	30.14	+.02	55.6	1.1	78	2	66	27	25	45	36	44	75	2.65	1.0	11	4,345	ne.	36	se.	27	11	7	12	5.3	60.1	1890	48.0	1873
Meridian.....	358	23	29.75	30.14	+.02	52.6	0.9	76	3	63	23	25	42	39	44	78	4.46	0.9</														

## Climatological data for November, 1893—Weather Bureau Stations—Continued.

Districts and stations.	Elevation above sea-level, feet.	Length of record, years.	Pressure, in inches.		Temperature of the air, in degrees Fahrenheit.					Humidity and precipitation.					Wind.				Mean temperature data since opening of station.													
			Mean pressure, 8 a. m. and 8 p. m. + z.	Mean reduced.	Departure from normal.	Mean max. and min. + z.	Departure from normal.	Maximum.	Date.	Mean minimum.	Date.	Greatest daily range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal.	Days with or more.	Total movement, miles.	Prevailing direction.	Maximum velocity.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Highest for month.	Year.	Lowest for month.	Year.				
Up. Miss. Val.—Con.																																
Davenport.....	613	23	29.39	30.07	-.02	36.2	-3.1	71	1	44	4	24	28	30	24	67	2.56	+0.6	7	6,837	sw.	37	sw.	22	11	11	8	5.0	42.3	1878	30.7	1880
Des Moines.....	869	16	29.12	30.09	-.01	35.8	-2.2	72	1	46	1	30	26	39	22	66	1.51	+0.4	4	5,565	nw.	34	sw.	16	15	11	4	4.1	42.0	1878	27.9	1880
Dubuque.....	651	21	29.32	30.05	-.03	34.6	-1.4	73	1	43	1	24	26	36	25	78	2.03	+0.0	4	4,065	nw.	24	nw.	21	12	8	10	5.0	39.8	1880	27.3	1880
Keokuk.....	613	23	29.40	30.08	-.01	38.9	-2.4	74	1	49	7	24	29	36	36	66	2.26	+0.3	6	5,572	nw.	32	w.	21	18	7	9	3.2	44.2	1880	31.5	1880
Osaka.....	359	23	29.73	30.13	+.02	46.1	-2.3	74	2	54	19	24	38	31	36	73	3.75	+1.5	7	6,472	nw.	38	nw.	29	16	6	6	4.0	52.1	1879	37.2	1880
Springfield, Ill.....	644	15	29.39	30.10	-.01	40.0	-3.2	71	11	50	8	24	30	38	28	68	1.57	+1.3	5	7,058	s.	28	s.	1	13	5	12	4.0	45.6	1885	32.3	1880
Hannibal.....	534	22	29.49	30.08	.....	40.4	.....	75	1	51	9	24	30	39	28	67	1.25	.....	5	6,255	sw.	36	sw.	16	13	11	6	4.5	.....	.....	.....	.....
Saint Louis.....	571	23	29.48	30.10	-.02	44.1	-2.1	73	1	52	15	24	36	37	31	66	1.35	+1.5	4	7,937	se.	36	nw.	29	10	5	9	4.1	49.6	1883	31.9	1880
Missouri Valley.																																
Columbia.....	.....	.....	.....	.....	.....	42.4	.....	76	1	55	6	24	30	42	.....	1.16	.....	4	5,391	nw.	28	sw.	16	17	6	7	3.9	.....	.....	.....	.....	
Kansas City.....	963	6	29.05	30.11	-.01	41.0	-2.3	75	1	51	14	24	31	34	28	64	1.38	+1.1	3	6,290	se.	36	sw.	16	15	10	5	4.0	46.4	1890	39.0	1891
Springfield, Mo.....	1,356	7	28.64	30.11	-.01	43.1	-3.1	72	1	53	14	24	34	31	30	68	1.54	+2.2	7	7,392	se.	36	se.	25	13	10	7	4.2	48.2	1890	41.0	1889
Topeka.....	.....	.....	.....	.....	.....	42.6	.....	80	1	55	15	24	30	41	.....	1.30	.....	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Omaha.....	1,123	23	28.87	30.11	-.03	36.8	-2.2	72	4	46	0	30	27	35	23	64	0.43	+0.8	5	5,704	nw.	30	nw.	30	16	9	5	3.9	43.8	1878	26.4	1880
Valentine.....	977	27	28.09	30.09	-.09	33.8	-4.6	73	1	49	9	30	30	52	18	62	0.54	+0.2	7	7,565	w.	48	nw.	21	14	6	10	5.3	40.6	1888	29.9	1886
Sioux City.....	1,165	23	28.78	30.07	.....	33.9	.....	73	6	45	4	30	33	44	30	67	0.75	.....	6	8,023	nw.	42	s.	25	13	11	6	4.4	.....	.....	.....	.....
Pierre.....	1,470	23	28.43	30.08	.....	32.8	.....	73	6	43	4	30	22	42	21	72	0.40	.....	6	6,128	nw.	35	nw.	16	7	14	9	5.4	.....	.....	.....	.....
Huron.....	1,310	13	28.59	30.06	-.05	29.3	-2.1	77	6	45	8	30	16	50	17	70	0.72	+0.2	6	9,390	nw.	40	se.	25	11	13	6	5.3	34.6	1890	24.2	1891
Yankton.....	1,332	21	28.69	30.06	-.05	34.3	-1.4	75	1	45	5	30	24	44	19	63	0.67	0.0	5	7,217	nw.	42	s.	6	10	14	6	4.7	39.2	1890	23.5	1880
Northern Slope.																																
Havre.....	2,477	14	27.34	30.06	-.03	25.2	-5.6	64	5	34	16	30	16	38	16	70	0.80	+0.1	9	7,682	sw.	36	w.	16	3	17	10	6.4	40.6	1890	21.0	1880
Miles City.....	2,374	16	29.46	30.07	.....	27.6	-3.7	67	5	36	14	30	19	36	20	76	0.50	+0.1	10	3,393	nw.	26	w.	13	10	4	16	6.6	38.9	1885	20.4	1880
Helena.....	4,118	14	23.79	30.13	-.01	31.0	-1.6	63	5	39	12	30	23	35	20	67	1.44	+0.9	11	5,239	sw.	40	sw.	12	10	5	15	6.0	39.1	1885	19.3	1880
Rapid City.....	3,280	8	26.39	30.07	-.07	33.6	-2.2	69	5	44	6	30	23	38	19	61	0.33	0.0	7	6,955	w.	40	nw.	16	8	9	13	6.4	42.1	1890	31.0	1888
Cheyenne.....	6,105	23	23.90	30.14	-.01	34.5	-0.6	62	1	46	3	23	24	32	20	57	0.29	0.0	5	8,516	nw.	50	ne.	20	14	12	4	3.9	39.3	1873	23.1	1880
Lander.....	5,377	23	24.61	30.17	.....	29.6	.....	63	5	45	5	18	14	43	16	64	0.57	.....	4	3,418	w.	50	w.	26	14	16	0	3.6	.....	.....	.....	.....
Coarney.....	2,205	27	27.71	30.11	.....	30.8	.....	77	1	50	4	30	24	43	21	63	0.04	.....	2	9,637	nw.	48	n.	17	16	11	3	3.5	.....	.....	.....	.....
North Platte.....	2,841	20	27.07	30.14	-.02	35.0	-2.3	74	1	50	1	23	30	48	18	61	0.11	+0.3	3	6,373	nw.	42	nw.	31	10	18	2	4.4	39.7	1878	24.0	1880
Middle Slope.																																
Colorado Springs.....	6,098	13	23.99	30.13	.....	35.0	-1.9	67	1	49	2	23	23	40	14	47	0.14	+0.3	4	8,026	n.	65	nw.	21	19	6	5	3.2	40.4	1890	30.9	1877
Denver.....	5,287	22	24.74	30.14	-.04	39.0	-1.0	71	1	52	8	23	26	41	15	43	0.55	+0.1	6	5,790	s.	37	nw.	28	13	13	4	4.1	42.9	.....	.....	.....
Pikes Peak.....	17	17	17.62	.....	.....	10.4	.....	28	9	15	14	22	6	22	2	71	1.56	.....	15	18,852	sw.	104	sw.	30	9	7	14	5.7	18.3	1887	0.4	1880
Pueblo.....	4,734	6	23.25	30.12	.....	39.4	.....	72	1	55	9	23	23	48	12	40	0.06	.....	1	5,666	w.	43	n.	17	16	10	4	5.6	42.3	1893	33.0	1889
Concordia.....	1,410	9	28.57	30.12	-.02	39.4	-1.3	75	5	51	11	30	28	42	26	69	1.01	+0.4	3	5,478	s.	32	s.	6	20	8	2	2.6	44.6	1890	36.6	1889
Dodge City.....	2,523	20	27.41	30.12	-.01	40.4	-1.9	80	1	53	11	23	27	44	30	55	0.42	-0.1	4	8,108	se.	54	se.	25	20	5	5	3.7	45.2	1885	26.2	1880
Wichita.....	1,366	6	28.62	30.12	.....	42.4	.....	82	1	53	15	23	31	41	27	64	0.91	.....	6	6,701	n.	36	n.	2	16	10	4	3.7	45.9	1890	39.4	1889
Oklahoma City.....	1,239	28	28.79	30.14	.....	45.4	.....	83	1	57	18	24	31	41	32	69	1.26	.....	6	6,798	n.	44	n.	30	21	2	7	3.2	.....	.....	.....	.....
Southern Slope.																																
Abilene.....	1,748	9	28.27	30.14	.....	50.8	-2.9	86	1	61	26	24	41	35	33	59	1.00	+1.7	7	8,402	n.	48	ne.	30	18	6	6	3.3	56.2	1885	47.8	1889
Amarillo.....	3,691	25	28.13	.....	.....	42.6	.....	76	1	53	16	18	32	38	23	52	0.28	.....	3	12,214	n.	60	n.	11	17	9	4	3.3	.....	.....	.....	.....
Southern Plateau.																																
El Paso.....	3,796	16	26.25	30.15	.....	51.2	-0.9	89	2	65	25	14	37	39	19	34	0.03	-0.5	1	6,612	nw.	45	n.	25	25	5	0	1.6	57.3	1878	46.3	1880
Santa Fe.....	7,051	20	23.27	30.14	+.01	38.4	+0.3	59	1	48	19	23	28	27	12	40	0.29	-0.6	3	4,556	ne.	29	nw.	30	24	4	2	2.0	42.7	1873	29.6	1880
Tucson.....	2,432	10	27.54	30.09	.....	54.0	-3.0	84	8	70	29	21	36	44	39	49	0.43	-0.1	2	5,802	nw.	43	sw.	18	27	0	3	1.4	58.6	1892	53.6	1881
Yuma.....	141	19	29.88	30.03	+.01	60.0	-1.5	64	8	75	32	19</																				



Chart I. Tracks of Centers

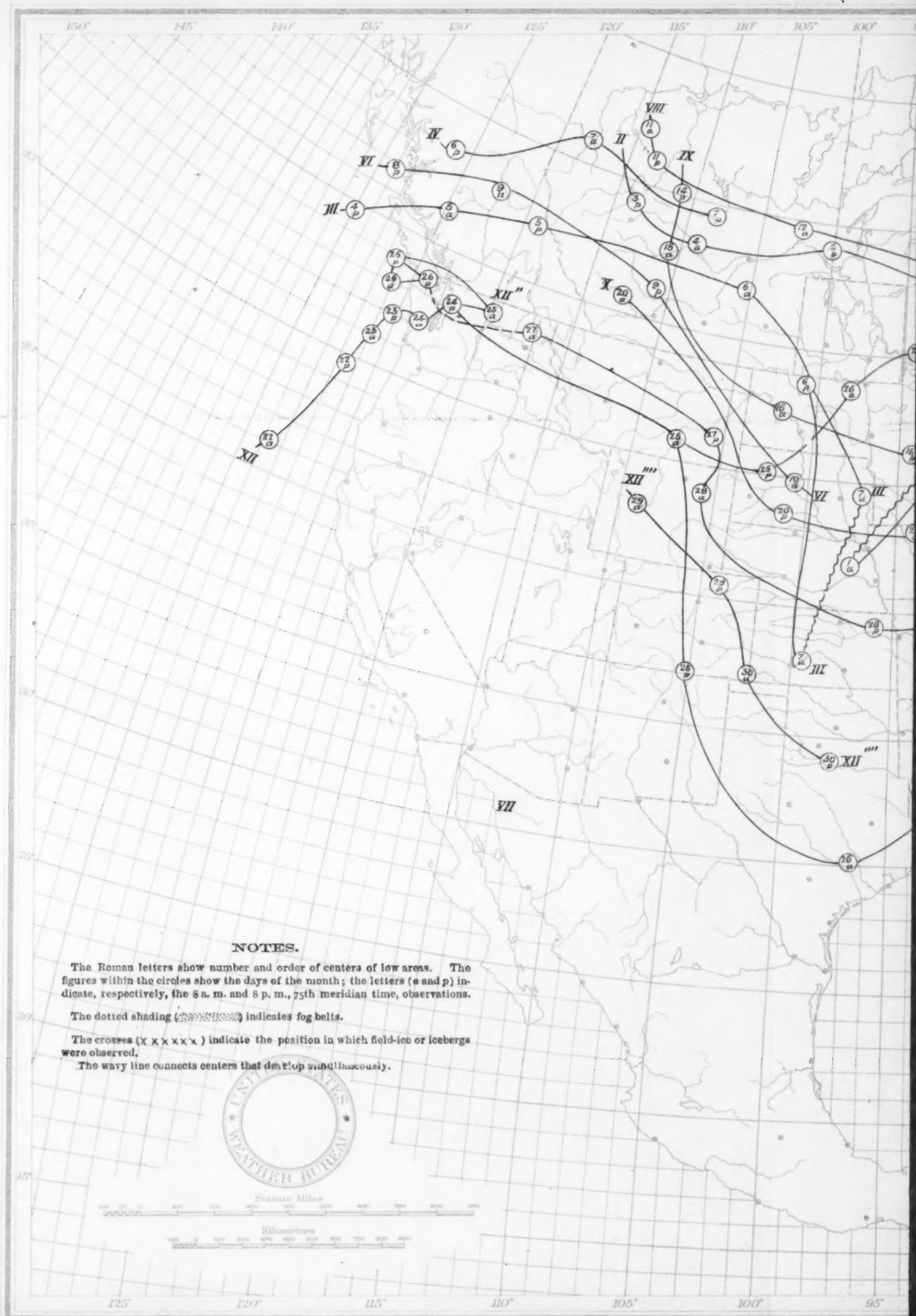
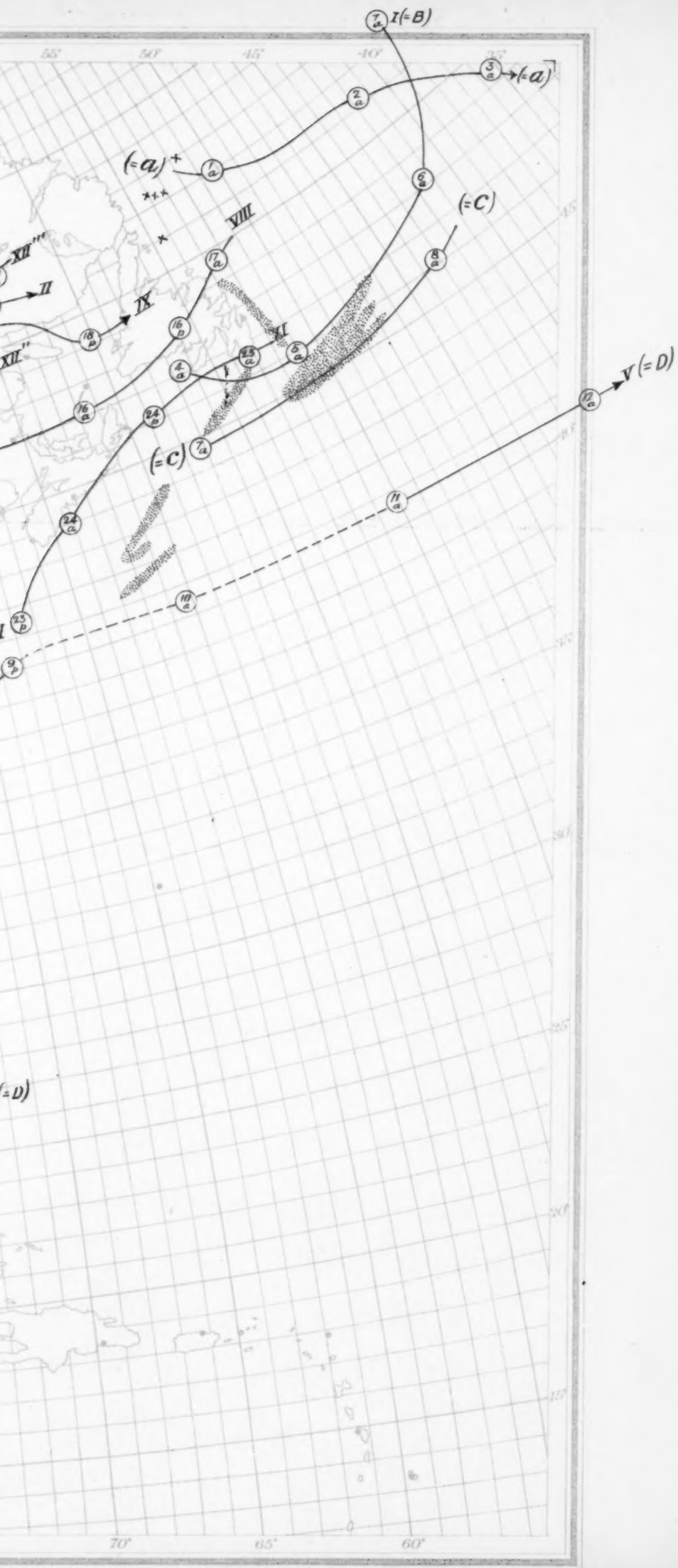


Chart I. Tracks of Centers of Low Areas. November, 1893.







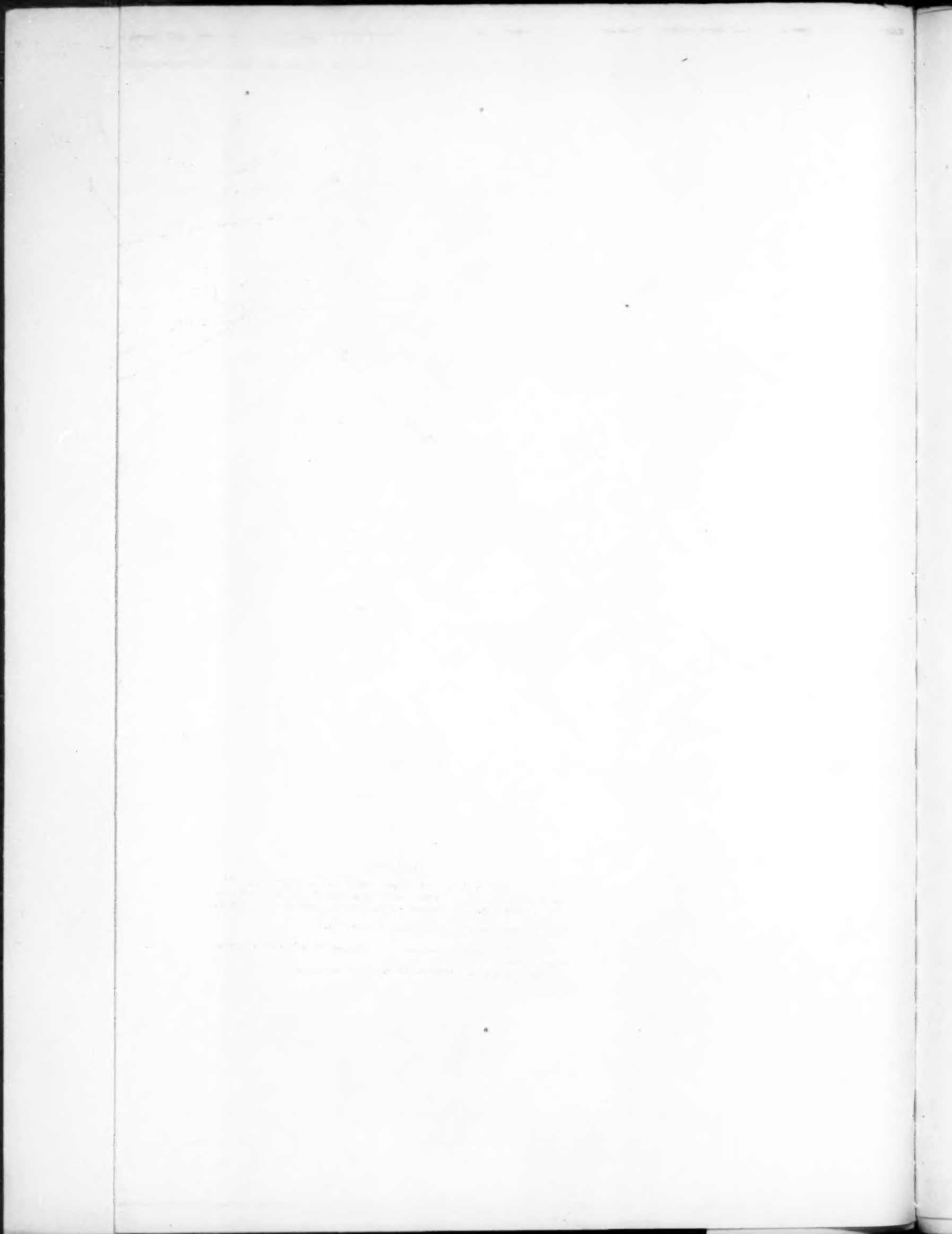
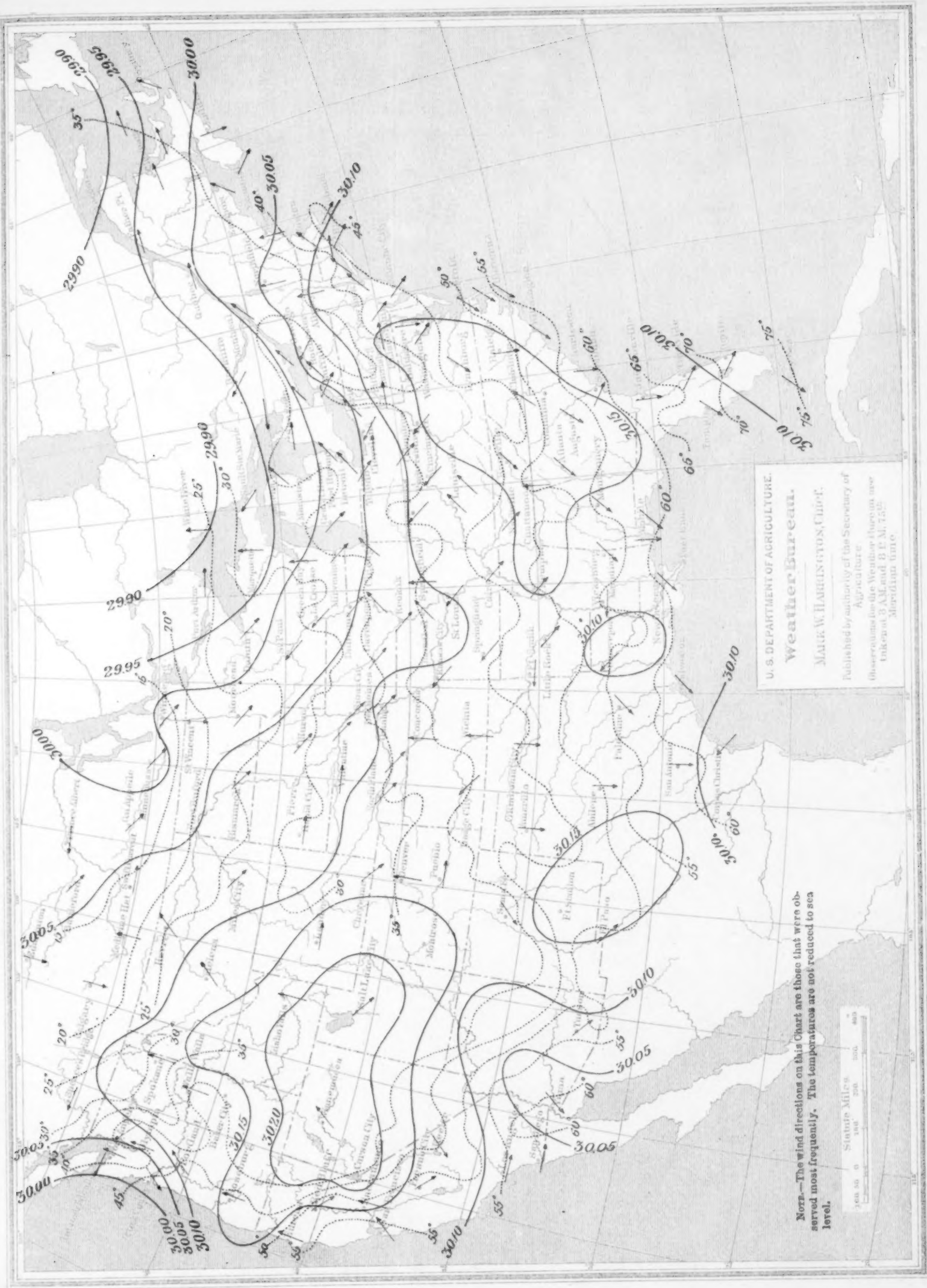




Chart II. Isobars, Isotherms, and Prevailing Winds. November, 1893.



U. S. DEPARTMENT OF AGRICULTURE.  
**Weather Bureau.**  
 MARK W. HARRINGTON, Chief.  
 Published by authority of the Secretary of Agriculture.  
 Observations for the Weather Bureau are taken at 3 A.M. and 8 P.M. 75°  
 Meridian time.

**Note.**—The wind directions on this Chart are those that were observed most frequently. The temperatures are not reduced to sea level.





Chart III. Total Precipitation. November, 1893.

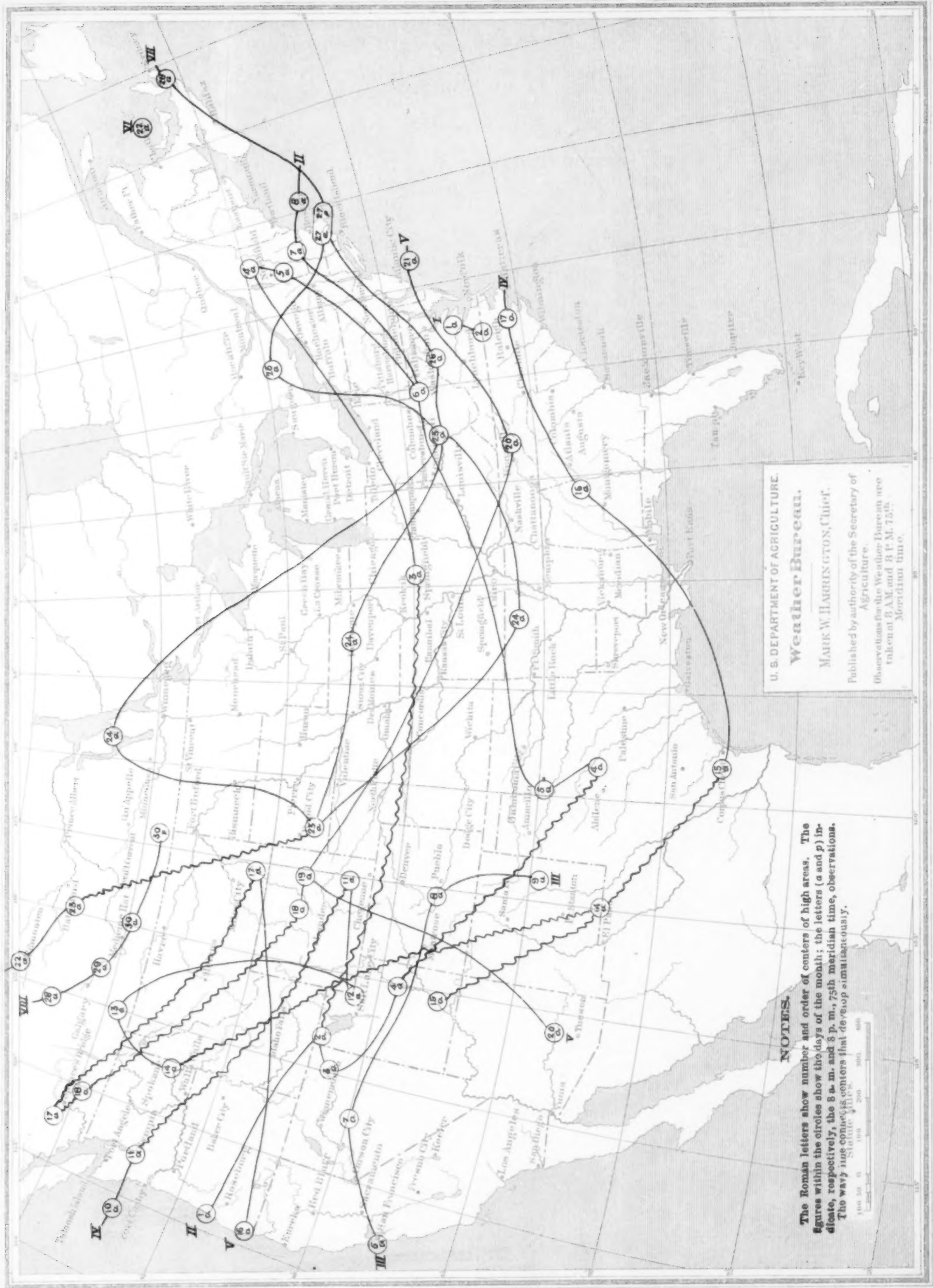






Chart IV. Tracks of Centers of High Areas. November, 1893.

VII



**NOTES.**

The Roman letters show number and order of centers of high areas. The figures within the circles show the days of the month; the letters (a and p) indicate, respectively, the 8 a. m. and 8 p. m., 75th meridian time, observations. The wavy line connects centers that develop simultaneously.

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Chart V. Normal Pressure (20 years) and Normal Resultant Wind Direction (15 years) for November.

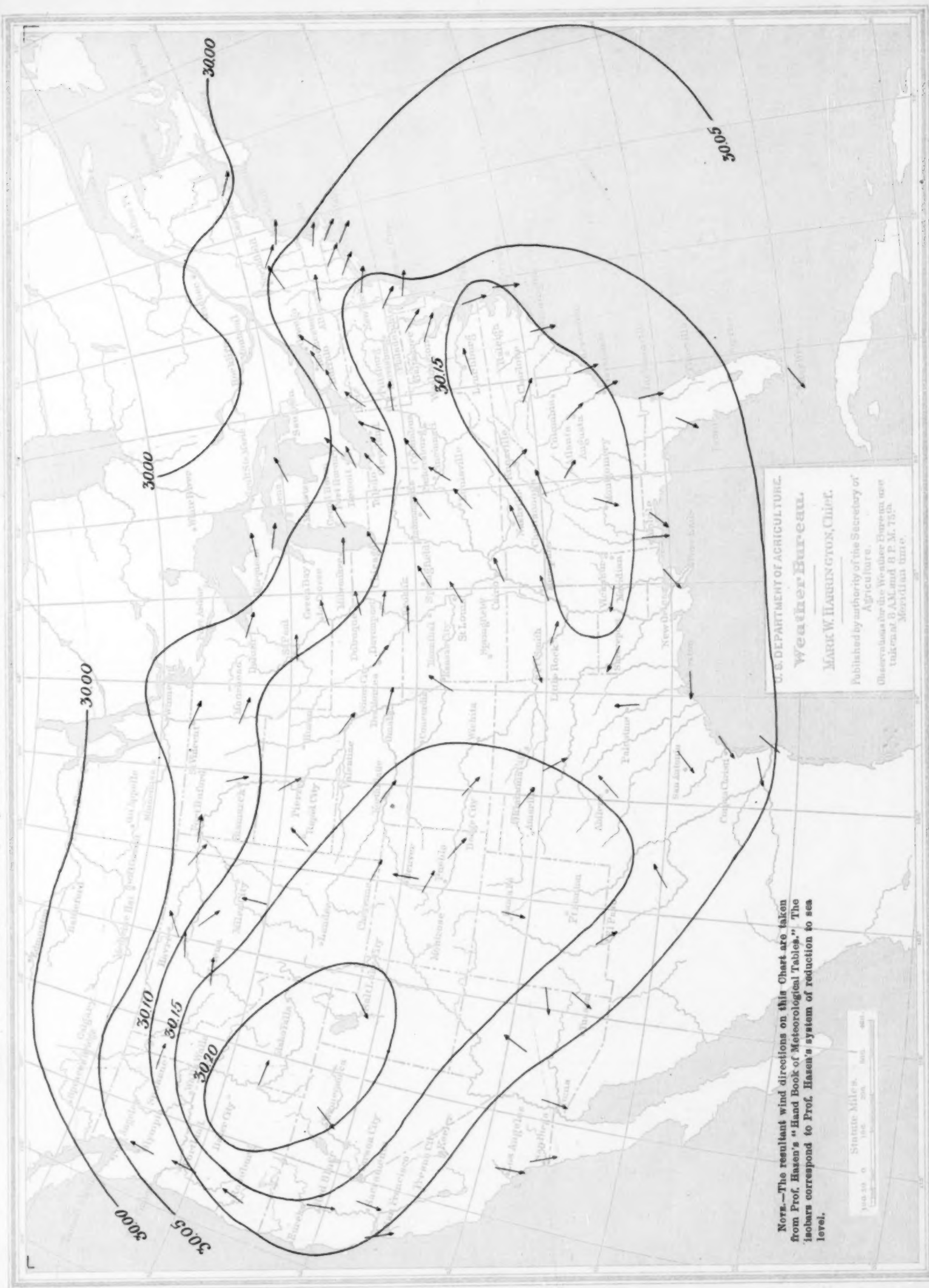






Chart VI. Depth of Snowfall (inches) and Limits of Freezing Weather, November, 1893.

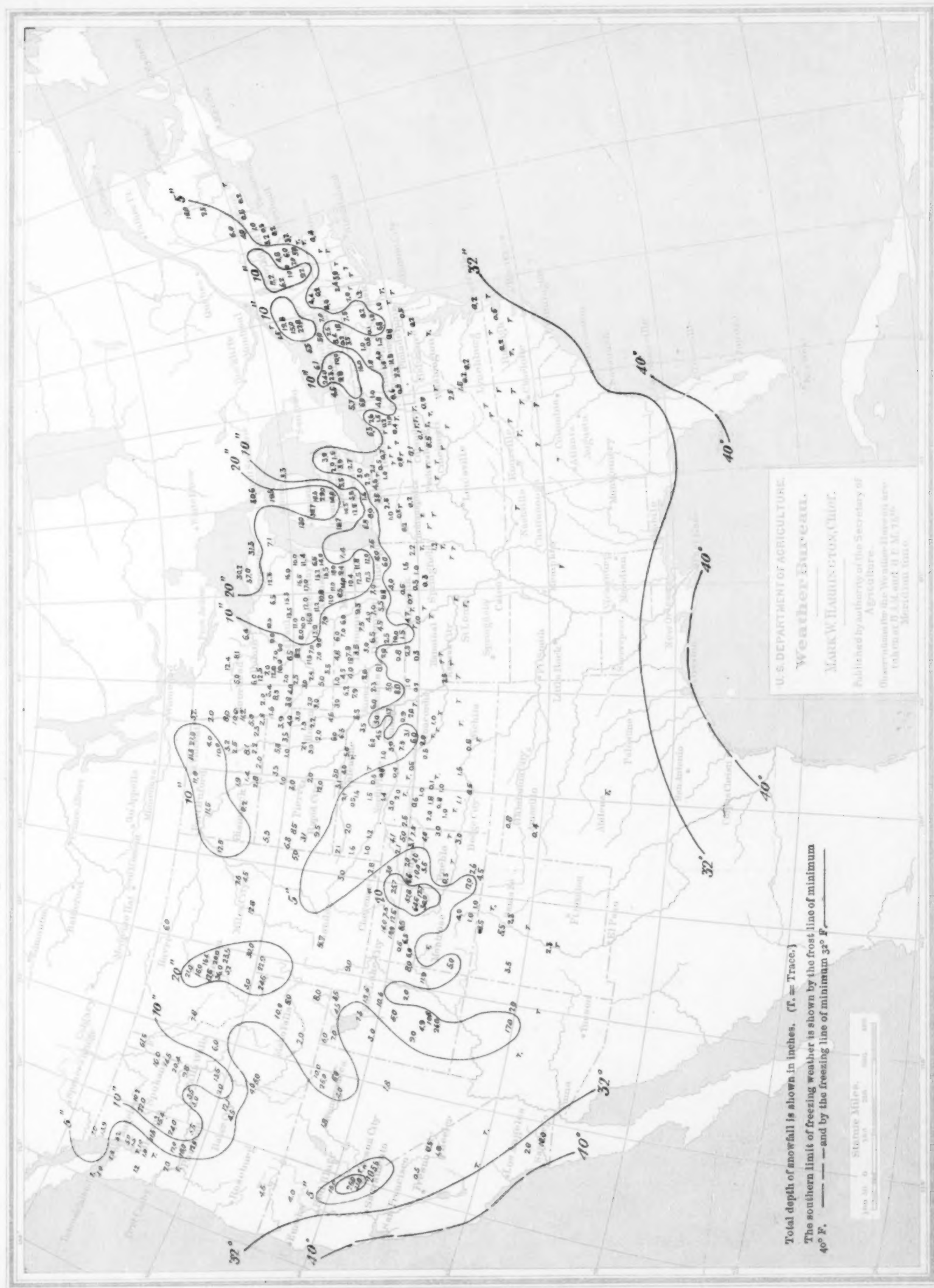






Chart VII. Depth of Snow (inches) lying on ground November 30, 1893.

